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THE REPETITION
OF PHONEMIC CHARACTERISTICS IN RADICAL MORPHEMES IN SETS
OF SYNONYMS FROM INDO-EUROPEAN LANGUAGES*

CONCLUSION

II.

21. Through its continuations our treatise has now acquired a size unusual for the present periodical and so the editors wish it to be brought to a conclusion. In what follows, therefore, we shall no longer be able to guide our reader on the research path step by step — as we have done so far in the wish to facilitate a strict control of our procedure. In the conclusion we have to restrict ourselves to a presentation of the main features of the so far achieved picture of our insights concerning the ultimate problems posed by the material collected and the statistically discovered laws. The analyses carried out for this purpose, either within the narrower scope of our material or within a broader framework, will be presented mainly in their final results. Since the time available has not allowed us to start some additional analyses or to carry through some analyses already begun, the picture of our insights will be less clear also in places where it might have been made clearer. This is what we should like to call to the reader's attention; on the other hand it is true that a final, possibly exhaustive elucidation of bulky statistical material can hardly be realized in a periodical publication, which has already kindly allowed us a sizable space for the presentation of the material, the counting of it, tabulary illustrations and calculations.

22. **The existing relation between meaning and sound with individual phonemic characteristics.** It has been claimed (under 6) that the non-accidental relation between sound and meaning as seen in the statistically relevant numerical superiority of a particular phonemic characteristic may be based only on the auditory-articulatory features of that characteristic. In Table No IX we have outlined the possible parallelisms in the perception of real phenomena and the auditory and articulatory (i. e., tactile and propriocep-

* See First Part, *Linguistica* VI, 1964; Second and Third Part, *Linguistica* VII, 1 and 2, 1965; Fourth and Fifth Part, *Linguistica* VIII, 1 and 2, 1966—1968; Sixth and Seventh Part, *Linguistica* 1 and 2, 1969.

tive) perceptions originating at the production of phonemes and phonemic groups.

Accordingly, one might assume that single instances of the significant phonemic characteristics might be adequately explained through a consistent comparison of those specific auditory and/or tactile and/or proprioceptive perceptions which are probably caused by the kind of phenomena denoted by that phonemic characteristic with the specific perceptions as originated by the phonemic characteristic itself. In fact several such comparisons have been outlined in the introductions to the individual conceptually determined synonymic sets. Now, when we are attempting a systematic recapitulation and complementation of the comparisons it has to be pointed out that the thesis about the dependence of a significance of a particular phonemic characteristic upon the auditory-articulatory features of this characteristic nevertheless cannot be maintained in all cases.

The direct dependence of the significance upon this factor can be postulated only under the hypothesis that the assumed imitations came into existence in the period when the phonemes occurring in them already had the shape which is known from the Indo-European comparative grammar. On the contrary, if the assumed imitations came into existence before the phonemes occurring in them had their etymologically determined shape, then the significance of these phonemes or rather phonemic groups obviously depends on the auditory-articulatory features of their phonemic predecessors which could have been very similar or even notably different. Now, since the established morpho-semantic correlations in our statistical material contain several instances where the significance of the phonemic characteristics cannot be directly, or at least not wholly, accounted for by their auditory-articulatory features we are by this fact led to accept the explanation of the preceding shape of sound for these instances. In addition to the attempt to reconstruct, as everywhere else, the imitation process itself — through establishing perceptions of the same order and comparing them on the linguistic level and on the level of the imitated extra-linguistic phenomena — we must in these cases reconstruct also the particular preceding shape of the significant phonemic characteristic which will permit concrete insight into the intrinsic relation between sound and meaning.

23. The quantitative data about the individual phonemes and their structural relationship. The basis for the reconstruction of the imitative processes is to be found in the networks represented by the synonymic sets with recurring phonemic characteristics and by the denotative chains with recurring identical radical morphemes for the denotation of particular sets of essentially identically perceived phenomena. Each imitative type, however, is to be treated not in isolation but is to be viewed in the system of all the imitations in their totality and controlled as to what place it occupies in it. Several times we pointed out that the mutual relations of the significant phonemic characteristics, within the framework of each concept group as well as in the broader framework of all seven concept groups, reveal a quite definite structure,

a structure existing in parallelisms and oppositions (Table No XII). This structure is deduced from the quantitative analyses of the phonemic distributions in the individual concept groups; the phonemic distribution of the Representative Sample served here as a basis for comparison.

24. There is also a further analytical approach which can additionally explicate the mutual relations in the most important field of phonemic characteristics, i. e., in the field of combinations of two consonants. A phonemic distribution of this kind, as given in the Representative Sample and presented at the outset of our examination in Table No 1, may be analysed for itself with regard to the frequency of combinations and to their optimal arrangement. The arrangement in Table No 1 was just one of the possible arrangements and it was done without any previous internal analysis. The new arrangement in the Table No 1a (see the appendix) shows clearer the structure of the relationships of the two-consonant combinations in the Representative Sample. The essential feature of the new arrangement comes from the fact that on the left side above the diagonal from the bottom upwards there are all those consonant pairs which have relatively higher frequencies than pairs with the same kind of consonants in the reverse order. In this arrangement the central place is occupied by the consonant pairs containing a guttural; on the left in the lower corner the combinations of nasals and liquids are grouped; on the right in the upper corner we get the combinations of sibilants, dentals, and labials; whereas in the upper left-side corner and in the lower right-side corner there are mixed combinations of all these phonemic classes.

The new arrangement leads us to another no less surprising result. If we arrange according to such a scheme the corresponding phonemic distributions of the seven concept groups (Tables Nos 38 a, 39 a, etc.), it turns out that this permits a new manner of establishing the significant differences. Taking together the phonemic classes R, L, and I into one higher class *b*, taking together the phonemic classes S, T, and P into one higher class *c*, and preserving the numerically strongest phonemic class K as its own class *a* gives us nine simplified consonant combinations: *ab, ba, ac, ca, cb, bc, aa, bb, cc*. A Chi-square calculation on the basis of these nine simplified types reveals for all the seven concept groups significant differences from the Representative Sample. If now these differences are measured in detail by means of calculating the standard deviations, the particular characteristics of these differences from the Representative Sample become for the individual concept groups much more clearly noticeable than before. This applies especially to the negative significances: with the concept groups SMOOTH and NARROW the sum of the phonemic grouping *aa, ac, ca, cc*, is negatively significant whereas the remaining phonemic grouping, containing *b* combinations, shows a positively significant sum. With the concept groups SMELL, TOUCH, and BLOW a negative significance has been found for the phonemic grouping *aa, ab, ba, bb*, whereas the phonemic grouping in which there are *c* combinations displays a positive significance. With the concept groups SHARP

and ROUGH a negatively significant sum comes from the phonemic grouping **bb, bc, cb, cc**, whereas the opposite phonemic grouping, containing a combinations, has a positively significant sum. With the exception of the group ROUGH, which requires a special explaining, we may claim that those phonemic groupings which do not contain a consonant positively significant in the particular concept group are everywhere significantly below the normal level. (Tables Nos XVII, XVIII, and XIX).

In this way, distinguishing only three consonant elements, we obtain new parallelisms and oppositions for all the seven concept groups in addition to those presented in Table No XII; and the calculations of the significant differences on the basis of this arrangement offer the most convincing proof in favour of the thesis about the intrinsic connection between sound and meaning precisely because in the collection of the statistical material they could not have been foreseen let alone designed with this end in view. On the other hand, the picture obtained from the structure of the Representative Sample as regards the two-consonant phonemic characteristics in detail (Table 1 a) is strongly informative: a half of all the phonemic combinations is represented by the **aa, ab, ba, ac** and **ca** combinations with gutturals; one quarter by the **cb** combinations with sibilants, dentals, and labials in the first place, and with liquids and nasals in the second; and the last quarter by all the remaining combinations. If taking into consideration the diagonal from the bottom upwards, there is on the left side above the diagonal (concentrated here are those consonant pairs that have a frequency relatively higher than that of the reverse consonant pairs) more than three quarters of the consonant pairs, whereas the reverse consonant pairs make up only a weak quarter. And while the changes of the relative frequencies of the various combinations with **a, b** and **c** produce the established significant differences in the seven concept groups, the ratio 3 to 1 between the two parts on both sides of the diagonal remains essentially the same in the Representative Sample and in all the concept groups: the greatest variations of the ratio show slightly more than one r. m. s. deviation. This datum is all the more interesting because the consonant pairs on the left side above the diagonal roughly correspond to the possible two-consonant beginnings of the Indo-European radical morphemes; on the contrary, the consonant pairs on the right side below the diagonal for the greatest part cannot occur in these radical morphemes without an inserted vowel.

25. Although the seven concept groups discussed in our treatise represent probably the largest conceptually directly connected groups of synonymic sets from Buck's dictionary, referring to the sensorily perceptible phenomena and possessing outstanding phonemic characteristics, it is clear that the established morpho-semantic correlations cannot be the only ones in our population. We are led to believe that with further concept groups one may expect new significant phonemic characteristics or that we may come across the already established phonemic characteristics in a different or even in the same morpho-semantic correlation. In fact it is possible that a particular new

concept group might be — by a certain superior criterion — integrated with one of the hitherto established groups. In order to determine the adequacy of our choice of the seven general concept groups we have taken the sum of their consonant distributions with the deduction of the consonants from the recurring synonymic sets and the distribution obtained in this way has been compared with the distribution of the Representative Sample. It turned out that the consonant distribution of the integrated concept groups with the radical morphemes containing two consonants does not significantly differ from the corresponding consonant distribution of the Representative Sample. But it also turned out that there is a significant difference with the radical morphemes containing one consonant, as well as if we take the radical morphemes containing two consonants and those containing one together. Table No XIX shows in which places there appear considerable differences and in which places only slight ones: this gives us an idea which consonants or rather consonant groups are not sufficiently contained in the integrated concept groups, and with which consonants these groups are saturated. That is to say, where further significant characteristics may be expected and where not. For the present an analogous analysis of the vowels has to be postponed; yet as regards the significant consonant characteristics Table No XIX represents a fairly reliable criterion as to their definitiveness.

26. Imitations with R. The morpho-semantic correlation between the phoneme **R** and the denotations of the extra-linguistic phenomena in the synonymic sets of the concept group **ROUGH** is essentially characterized by the fact that **R** is a vibratory-periodical sound [27], 162, or in other words an interrupted sound [28], 21. Still, this objective physical, or rather physiological, fact is not decisive; what is more decisive is the fact that the Indo-European phoneme **R** was perceived as a vibratory-periodical, or rather, as an interrupted phoneme. Such a perception is to be found with every genuine **R**. From a phonetic point of view which disregards perception, all the voiced oral and nasal vowels, semi-vowels, nasal consonants, and glides are vibratory sounds as well as **R** [27], 163; [19], 72. With **R** the number of individual strokes per second is only around 25, and so the periodic quality of the acoustic effects and movement can still be perceived; with a higher number of strokes per second, however, the individual strokes can, at least auditorily, no longer be distinguished [30], 86. As regards the possibility of perceiving the vibration, **R** differs from the remaining vibratory sounds as well as from those having no vibration; and a semantic analysis of the synonymic sets under **ROUGH** shows that it is this property of the Indo-European **R** which makes it possible to relate it to the phenomena denoted in these synonymic sets. It appears that all the words in the Indo-European languages listed under **ROUGH** and containing in their roots **R** are originally related to phenomena which have as one of their dominant features temporary sequence or spatial discontinuity or both. The general pattern of the imitation process is here, just as with all other imitations: phenomenon — perception : perception — phoneme. And the concrete pattern in its fundamental form is: phenomenon

— perception of stimuli one rapidly following the other in time, or perception of closely located, simultaneously or in rapid sequence perceptible stimuli in space : perception of quick, periodic beats in the organs of speech and the ears — phoneme **R**.

27. If we first take the occurrences of **R** in the onomatopoeias for »crying« (synonymic set 18.13), **R** obviously imitates a vibrating noise accompanying the phonation at a maximum adduction of the vocal chords, sphincteric constriction and vibration of the supraglottic elements and participation of the strong extra-laryngeal muscles; the voice produced in such an instance is crude and hoarse [30], 45. The roots with **R** — vowel and with **KR** — vowel in 18.13 have many parallels not occurring there. In several of those roots we find the specific meaning of »hoarseness«, where owing to the swollen vocal chords the vibration of sound can distinctly be heard. Opposed to crying and hoarseness is singing, the most marked example of pure voice; the names for singing are grouped together in the synonymic set 18.12 under SHARP. There we see — with the exception of the late, secondary, New Greek term — no synonym containing the **R** phoneme. The consonants occurring in the old, probably primary terms, accompanying the characteristic gutturals are either **N** or **L**: the voiced nasal and lateral fricatives convey the sensation of a continuous ringing and echoing of the vocal sound. Also in the index of meaning of the Indo-European roots in WP* we find under the entry »sing« only one further radical morpheme with **N**. The opposition in denoting a vibrating, hoarse sound with **R** and in denoting a continuous, ringing sound with **N** or **L** surprisingly corresponds with the statistical findings for the concept group ROUGH, where the positive significant **R** on the one side is paralleled on the other side by the negative significant **N**, and also the frequency of the **L** phoneme is more than two r.m.s. deviations lower than expected. Since the synonymic sets under ROUGH are for the most part related to the non-acoustic phenomena, and since the phonemic opposition is equal, there is in fact an underlying parallel perception of the discussed sounds in the auditory and the non-auditory spheres.

28. The leading synonymic sets in the concept group ROUGH, i.e., 15.76 rough, 11.14 seize, grasp, take hold of, and 12.74 crooked were chosen with a view of the general nature of the phenomena they denominate: rough and crooked are two broad qualitative phenomena, and seize or grasp represent one of the most characteristic activities of the human hand. These synonymic sets show an occurrence of the phonemic characteristic **R** relatively higher than found in the synonymic set 18.13 for crying: with crying there are 4 radical morphemes having a **R** characteristic of the 13 radical morphemes taking part in the synonymic set, with rough 9 in 14, with seize and grasp 7 in 22, and with crooked 5 in 12.

* WP = Alois Walde and Julius Pokorny, *Vergleichendes Wörterbuch der indogermanischen Sprachen*, Berlin und Leipzig, 1930.

The established numerical superiority can be based on nothing else but on the tactile-proprioceptive imitation. The perception of the actively sensed coarseness when feeling the surface of an object has already been described. This is a »discontinuous tactile and proprioceptive feeling of a surface where small prominencies alternate with small indentations at minimum distances«. But we may also passively sense the coarseness through somebody else's touch; this occurs with the phenomenon of grasping when we feel the touch of the individual, slightly separated, fingers and nails on our skin when somebody else has vigorously seized us. And beside this passive perception of grasping we get another, active one: this is the preception of crooking the hand and fingers when we seize something. This second perception is obviously the basis for a particular meaning of the word grasp — if we say 'grasp at something' we are not concerned with grasping as an accomplished fact but only with an attempt of that: hence with stretching the arm and crooking the hand. And this crooking and contraction of the hand is one of the most marked examples of crooking and contraction experienced by man on his body. The phenomenon of grasping as an activity and the generic qualitative phenomenon 'crooked' certainly contain the same objective, physical element of crookedness; in view of the outlined general reasons we may assume that also their imitations with the phonemic characteristic **R** go back to the same subjective, proprioceptive perception of successive stimuli, arising from the muscles and joints when the muscles of the crooked hand or of another part of the human body are drawn together.

Such, then, is the reconstruction of the imitation process for the leading synonymic sets in our concept group; this process, allowing for individual variations, is postulated also for the remaining synonymic sets in our group, referring to various physical activities of man, to tools, and to other objects. Where in these synonymic sets we are concerned with imitations with an **R** characteristic, we could probably, from one instance to another, demonstrate that in all likelihood this is a case of the same or similar perception of the imitated phenomena as delineated above. Such an exhaustive explanation, however, cannot be included, and also in the majority of cases it is not strictly necessary for an understanding of the individual imitations. Let us only mention a few synonymic sets where the similarity to the already discussed ones is striking. The rake is clearly a prolonged grasping hand, and all the seven Indo-European radical morphemes, established in the independent synonyms for this tool, exhibit the phonemic characteristic **R**. With harrow, which represents a similar variant of the tool constructed after the pattern of the human hand with separated fingers, we find among the 14 names taken into account in this synonymic set 8 names with **R** in the radical morpheme, etc. A special explanation is called for by the synonymic sets break which has 6 **R** characteristics of the 13 taken into account, and tear which has 8 **R** characteristics of 16 — but we shall return to these two sets later. A further significant activity of the human hand which we must point out is described in the synonymic set rub; the 4 radical morphemes of the 7, which appear in our statistical calculation, clearly with their phonemic

characteristic **R** symbolize the quick, successive touching of fingers and palm balls when rubbing the hand over skin.

29. Although in all these sets the numerical superiority of the phonemic characteristic **R** is non-accidental, as it has been shown by the statistical analysis, and although the suggested explanation seems the only one acceptable, we are still faced with the question: if there are so many expressions constructed systematically, what is the origin of the other expressions which in the given synonymic set do not have a significant **R** characteristic? Let us explain the way how we consider this question, which, if put in an analogous way, may be applied also to other concept groups and is hence of a general nature, on the example of the synonymic set *rub*. This set was not classified only into the concept group **ROUGH** but also into the concept group **NARROW**. The reason for this double classification was the fact that all the radical morphemes which do not have the phonemic characteristic **R** have a uniform phonemic characteristic **N**. We have been justified in assuming that probably this as well is non-accidental and that this non-accidental character is related to a different basic perception of the phenomenon of rubbing. It actually turned out that radical morphemes with the characteristic **N** from the synonymic set *rub* recur in several synonymic sets of the concept group **NARROW** and that the structures of these roots agree with the typical structures as shown by the radical morphemes with the **N** characteristic. The basic perception of the phenomenon of rubbing is then in these cases pressing, squeezing. It follows that with reference to our statistical material it would be wrong to presuppose, in principle, just one possible perception of a particular denoted phenomenon and just one possible imitation of it; there may be more perceptions, naturally also more than two, and for this reason the picture offered by other synonymic sets is no longer so simply contrasted as with the set *rub*. As a special case let us mention the alternation of the positive and negative perception. In the synonymic set 15.76 *rough* there are among the 5 considered roots which do not contain the **R** characteristic as many as 3 such roots which denote smoothness, and two of these have the **L** characteristic, a characteristic typical of smoothness. The meaning of *rough* is created through a negative prefix (not included, according to our rule, in the statistics of the radical morphemes): roughness is perceived as non-smoothness. The simultaneous presence of several ways of perceptions and imitations of the same phenomenon is an important reason why the synonymic sets usually consist of radical morphemes with different phonemic characteristics. Another reason lies in the sound demotivation of the imitative radical morphemes, i. e., in the fact that these morphemes are associated with other phenomena in a way that is not based on the original sensory perceptions connected with the imitations. This process, which is essential for the transition from the imitative representation of the reality to the encoded one, is doubtlessly reflected also in the earliest strata of our statistical material; but since it cannot be used in our explanation of the imitations we shall not dwell on it.

30. To put what has been said so far into a proper perspective, we must point out that what has been established under 25 generally for our statistical material applies also to the concept group ROUGH. The synonymic sets occurring in this concept group do not represent the whole of the synonymic sets which exhibit a numerical superiority of the **R** phonemic characteristic; they do not represent all such sets found in Buck, and still less the sets not included in his dictionary. This is readily shown on an examination of Buck's sets and still more readily on an examination of Pokorny's etymological dictionary and of other standard etymological dictionaries. The semantic range of the radical morphemes under ROUGH is already considerably wider than the set of meanings represented in this concept group, and the morpho-semantic area of **R** becomes still wider when we take a look at the radical morphemes that have remained outside the concept group.

By means of **R** man imitates not only the willful contraction of his limbs but also the wrinkling of the skin and particularly the spontaneous spasm or cramp; further the trembling and shivering and the related disgust, cold, and fear; as a result of the spasm or trembling the stiffness of limbs and their rigidity, and related to the rigidity the stretching and straightness; further the general movements of the limbs to and fro, and the movements of the whole body or of objects to and fro, like mixing, roaming, swarming, rotation, beside the already met boring, and related to the rotation the roundness; repeated quick movements of the legs as found in rushing and running, quick successive opening and closing of the eyes and the related trembling of light and twilight; and finally boiling, spraying and trickling in addition to the already met retching; crushing in addition to the already met breaking and tearing, scratching and cutting in addition to rubbing and a great series of discontinuous or rough acoustic phenomena. Our enumeration does not pretend to be exhaustive; still, it seems that all the imitations mentioned are based on the same pattern of perception which has been established for the imitations under ROUGH, and so individual, not mentioned, imitations cannot be expected to change essentially the borders of the described morpho-semantic area of **R**. This is demonstrated also by our comparison of the integrated consonant distribution of all the seven concept groups with the basic consonant distribution of the Representative Sample: the phoneme **R** has in the integrated consonant distribution an approximately equal, or even higher, relative frequency as in the normal consonant distribution; the phonemic distribution of further synonymic sets exhibiting a numerical superiority of the **R** phonemic characteristic may therefore be expected to be on the whole parallel to the phonemic distribution of ROUGH.

31. Before concluding the present discussion of the **R** imitations let us try to offer some explanation why the phonemic distribution of the consonant pairs in the concept group ROUGH, presented in Tables Nos XVII and XVIII does not follow the general rule which otherwise applies to all other concept groups: namely, that the phonemic groupings in which there is no consonant that is with the particular group positively significant are

significantly below the expected average. This is obviously to be accounted for by the circumstance that the consonant pairs under **ca** and **aa**, particularly the pairs **SK** and **KK** have a too high relative frequency, as it can be seen in the Tables 3 a and 8 a. Neither of these frequencies is significant, but they shift the whole distribution into the frequency scheme of the concept group **SHARP**, instead of its agreeing with the frequency scheme of the concept groups **SMOOTH** and **NARROW**. The consonant pair **SK** is significant precisely for the group **SHARP**, and in the introduction to this concept group (*Linguistica* IX/1, 36) it was established that the phenomena of roughness and sharpness not seldom overlap; this, then, is to be seen in a somewhat higher frequency of the pair **SK** under **ROUGH**. It seems that the inter-relatedness of the two phenomena is reflected also in the simultaneous negative significance of **N** and **T** both under **ROUGH** and under **SHARP**. The comparatively frequent pairs **KK** in our concept group have another special reason of their own. The nature of the basic perception of the phenomena as it is hidden in the relevant phonemic characteristic occurring here can be deduced with a considerable degree of reliability from the synonymic set 12.75 hook. Beside the 4 radical morphemes with the **R** characteristic and the basic meaning of contracting, crooking, or a crooked object there stands a radical morpheme with double **K** (keg-, kek-) with the same basic meaning. If we take the double **K** in the root to be a reduplication, the perception patterns of the **R** characteristic and of the characteristic with the repeated **K** are in exact agreement. The main function of reduplication is in fact the expression of temporal sequence and discontinuity or of plurality in space [31], 286 f. There is also the question whether in the next radical morpheme in the set 12.75, which contains **K** as the sole consonant, **K** recurs in the extension of the root accidentally or not. The semantic range of this radical morpheme (keu-2) is rather wide, and its basic perception and imitation pattern so far have not been determined, there being on this point a gap in our material. Nevertheless the semantic range of the radical morpheme in question when extended with **K** comes very close to the semantic range of the radical morpheme keg-, kek- and of the remaining roots with double **KK** of the concept group **ROUGH**, which are frequently overlapping in their meanings. The finding about the basic perception pattern which links the phonemic characteristic of **R** with the phenomena imitated by it is in this way confirmed from another angle. Concording data concerning the described imitative value of **R** are to be found in H. Wisseman for artificial onomatopoeias in German [18], in M. Grammont for a considerably extensive material from the Indo-European languages [19], and particularly in P. Guiraud for many French and Provençal words that are usually not considered to be imitative [32] in his study of the morpho-semantic field of the root **T. K.**

32. **Imitations with N.** The phoneme **R** may be freely produced in a number of places in the organs of speech, from the pharynx to the lips, yet always in essentially the same way and its perception is uniform. On the contrary, the production of nasals, although limited to just a few places of articulation,

can take place in various ways, and their perception differs as to the place of articulation and as to the way in which it is done. Since in the present study we grouped together all the varieties of nasals, we are interested chiefly in those circumstances of their articulation which are present with all of them and which are characteristic of the nasals as a phonemic class. The first property they share is that they are **nasal fricatives**, usually voiced but possibly also unvoiced. Their next property is that they are at the same time stops as regards the oral cavity: the air stream is directed through the nasal cavity while the oral cavity is more or less firmly closed by the velum. [33], 50. With this closure, weak or firm, the pulmonary air exerts no pressure as it is the case with the stops proper, because the passage through the nasal cavity is free. The third common property of nasals usually unmentioned or at least not stressed, is that under certain conditions they may also be stops as regards the nasal cavity and that under such conditions they are realized with strong nasal explosion. This occurs when they are articulated with energetical expiration anywhere in the word, but also in normal articulation immediately after oral stops, especially after gutturals. The difference from the production of stops proper lies in that with the nasal explosion the closure is released inwards, merely by means of muscular energy, against the driving pressure of the pulmonary air. [34], 119-120. The significant N characteristics, occurring in a part of our statistical material — in which the denotations of the auditory perceptible phenomena represent a very slight minority — unambiguously suggest that we have to do with imitations based on tactile-proprioceptive perceptions; various phenomena, perceived in their properties as parallel to the different articulatory properties of nasals described above, are imitated by the same general nasal characteristic or yet more closely rendered by specific nasal characteristics containing phonemic combinations with N.

33. The main assemblage of the N characteristics is to be found in the concept group NARROW where we get a parallel occurrence of the general significant characteristic N and the specific significant characteristic KN. Among the three leading sets in this group the synonymic set 12.14 thick (in density) contains 6 radical morphemes with the N characteristic of the total 13 roots taken into account; the specific characteristic KN is shown by three roots, two roots have TN, and one has PN. All these radical morphemes containing throughout a stop before a nasal refer to phenomena of pressing and of compressed compact objects, or to phenomena of tension or swelling and of tense or tumid objects. If we take this as a matter of the original sequence of a stop and a nasal with a later central vocalisation, the perception of the oral-nasal blocking in the onset and in the maintained closure of KN, TN, or PN is in agreement with the perception of the constriction and tightness in the pharynx when the body is under strain with the breath being held back. The predominant occurrence of the KN phonemic characteristic for the imitation of the phenomena of pressing and tension in the set 12.64 and in other parallel sets under NARROW is a consequence of the fact that, given an

equally strong articulation, the pressure of the muscles and the pressure of the air stream are stronger in the articulation of the phonemic group **KN** than in the articulation of the phonemic group **TN** or **PN**. Owing to the close neighbourhood of the back of the tongue and the velum the articulation of the phonemic group **KN** — as is shown by the semantic analysis of radical morphemes — is perceived as a whole, whereas with **TN** and **PN** the attention is paid on the one side to the nasal closure, and on the other side to the closure with the stretched, tense tongue, or with the tightened lips and inflated cheeks. In the concept group **BLOW** we find generally acknowledged imitations with the specific phonemic characteristic **PN** which denote the phenomenon of inflated cheeks and similar objects. We find further a imitative root (pneu-etc.) even with a direct sequence of the two consonants. The root clearly refers to physiological phenomena containing a nasal explosion (coughing, or suppressed laughter in Germanic languages, panting, hard breathing in Greek), and on the other hand to suppressed breathing (Grk. *pneûma* in the sense »a sentence declaimed in one breath«*) and to choking in the throat or strangling (Br. *nec'h* »anxiety« from the IE *pnek-s-* in the synonymic set 16.33 and Grk. *pnigō* »choke, throttle, strangle«, WP 2.85).

34. The next synonymic set where we must stop — this set giving the name for the concept group — is 12.62, narrow. Of the 12 radical morphemes considered there are 5 with the general **N** characteristic; of these one again has the specific characteristic **KN**, another one the reverse characteristic **NK**, and two have **SN**. Reconstructing the probable imitations we proceed best from the already known. The tactile-proprioceptive perception accompanying the energetic oral-nasal closure may be interpreted as an active pressing or tightening, or as a passive state of being pressed together or pressed tightly. These two phenomena and the corresponding notions are complementary. Therefore every radical morpheme denoting pressing has a potential meaning of narrowness. In our instance the basic meaning of the root with the **KN** characteristic (ken-2) is stated to be »scratch, rub«, yet there exists a homonymous root (ken-1) meaning »pressing, something pressed together«, and the difficulty for a fitting morpho-semantic interpretation of the synonym with the radical **KN** is only apparent; in fact, it is questionable whether the division into two morphemes is justified, as under 29 we see that the meanings of pressing and rubbing interchange. The radical morpheme with the reverse **NK** characteristic ang'h represents a typical example of the simultaneous appearance of the meanings of pressing and narrowness; the meanings »bind« and »bond« are but variants of the meaning »press«, and in this case the basic meaning of the constriction in the throat is directly exhibited in Latin. The perception of the articulation of the immediately connected phonemic group **NK** is basically identical to that of **KN** irrespective of the reverse order, and the imitation pattern is the same.

The specific characteristic **SN** is significant in **SMELL** in the morpho-semantic correlation with the phenomenon of smelling and tasting. An imitation

* Liddel, H. G. and Scott, R., Greek-English Lexicon, 9th edition, s. v.

of pressing or narrowness with the same characteristic in the synonymic set 12.62 may at first glance appear to be a strange one. Perhaps we can assume that SN represents in this case a closure in the pharynx blocking the air passage to the nasal cavity in the same way as KN, TN or PN, whereas in correlation with tasting under SMELL it represents a release of this closure through an energetic lowering of the velum and at the same time a beginning or performed closure towards the oral cavity. Such a perception of the nasal in the phonemic group SN is indicated by the meaning of »stroke« which appears in a great series of the radical morphemes exhibiting this characteristic, e. g., smēi-, snadh-, sneit-, under SHARP. This meaning of »stroke« can be taken also to be one of the parallel meanings in the two radical morphemes with the SN characteristic in our synonymic sets. Under mel-l, smel-, from which almost certainly the lengthened forms mēlo-, smēlo- come, we find the meanings »pound, smash, hammer, smite«, usually in forms without S, and in the Scandinavian languages particularly in SN forms. In view of the numerous semantic parallels also the meaning of »swift« beside »narrow« in snēbh-ri- goes back most probably to the original adverbial meaning »at one blow«, i. e., »at once«. The role of S in all the enumerated morpho-semantic correlations of the phonemic characteristics SN, is, however, not as clear as the role of the nasal; it seems that at least in part we must resort to the explanation based on the preceding form of S as generally postulated under 22 and practically outlined in the introduction to the concept group of SMELL. We shall again return to this problem, which is probably connected with the puzzle of the so-called shifting Indo-European S in the discussion of the S imitations. For the present let it suffice to establish that the last radical morpheme in the set 12.62 with the N characteristic is a morpheme with a shifting S ([s]nē-, [s]nēi-) and that the meaning of »narrow« — just as well as the meanings »bind« and »bond« — there appear in spite of the absence of S.

35. The last leading synonymic set under NARROW is 5.54 knead. It is in the title of this group because it clearly refers to man's manual activities and because the occurrence of the nasal characteristics in the set more obviously than elsewhere points to a parallelism or even to a synergism between the movements of the organs of speech and the hand. Of the 12 radical morphemes taken into account in our statistical calculation there are 6 with a general N characteristic, of these two with the specific KN characteristic, another two with the specific NK characteristic, while one morpheme has a specific characteristic not met so far — NN. The structure of the roots with KN is here identical with that in the sets 12.64 and 12.62; with one of them (gen-) it is clear that the underlying meaning is pressing, something pressed; while with the other (g'en-l), according to the traditional interpretation, it is said to be »beget«. In the light of our insights the basic »masculine« meaning has to be replaced by the »feminine« pre-Indo-European basic meaning »give birth to« which comes up in this root at least as frequently, and the basic perception of delivery as pressing be-

comes obvious. And the fact that the root *g'en-l* in our instance denotes manual pressing and that the manual pressing is identified with the general phenomenon of work (Nir. *fuinim* »I knead«: OIr. *gniu* »I do« in the synonymic set 9.11) has an exact parallel in another radical morpheme of our set with the NK characteristic (*mag'-*). In Greek this morpheme refers to »knead«, while in West-Germanic languages, including English, it gave a normal term for accomplished work: *make*. A similar parallel development of meaning is exhibited by another two roots in our set, a root with just a mere N characteristic (*mei-k'-*, *mei-g'-*) and a root with a double NN characteristic (*menðk-*): beside the meaning of »knead« there appears in both roots the meaning of »mix«. Therefore we may postulate for the first of the two roots the basic meaning to be »pressing«, just as well as for the second: the meaning »mix« is the final meaning and not the initial one. All the enumerated examples of the N characteristics in the discussed set 5.54 show an evident morpho-semantic correlation; this correlation is so clear that even the last, late synonym with the NK original characteristic in the root (*Bret. merat*), which came to mean »knead« by borrowing and by an unusual shift of meaning, can sooner be taken as an instance of secondary imitation — explained under 19 in the present conclusion — than as a purely accidental product.

As regards the perceptions of the specific nasal characteristics occurring here it must be pointed out that there is a predominance of the perception pattern of the energetic lowering of the velum with the indicated or performed closure against the oral tract; this perception pattern being similar to the one reconstructed with the SN characteristic for tasting. Thus the present NK characteristic must be interpreted. It differs from the one in the set 12.62 narrow where we spoke about the perception of a raised velum and a closure against the nasal tract. The difference is to be seen in the different structure of the radical morphemes: *mag'-*: *ang'h-*. The parallel NN characteristic probably reflects the twofold perception pattern of the preceding lowering and the following raising of the velum. It is additionally found also in the sets 4.207, 5.11, and 5.12, which all refer to feeding, and it appears therefore that it is precisely in the imitation of the movements of chewing — or more exactly in the imitation of the participation of the velum in the swallowing of the chewed food — where we may find its ultimate source. The identical structure of the roots with KN in our set and in the sets 12.62 and 12.64 is a confirmation for the validity of the assumption stated there that the ultimate source of KN imitations has to be seen in the imitations of the bodily effort or strain, optimally indicated by the KN characteristic of the raised velum and a closure against the nasal tract. Accordingly, the sense of manual pressing in our synonymic set is derived from nasal imitations of various origin.

36. We have not discussed here a large series of other morpho-semantic correlations in which the N characteristic occurs outside the group NARROW. One of them is the correlation between the N characteristic and a light,

undisturbed movement through openings and tube-like passages (slipping through), or a light, unforced movement across a surface (sliding); this meaning of the N characteristic is derived from the tactile perception of a light, undisturbed movement of the air through the immobile nasal cavity which does not and cannot in any way impede its movement. On the same perception of the movement of the air through the nose is based the N characteristic for smelling, which together with the already discussed N characteristic for tasting (referring to the perception of the lowered velum) appears in the concept-group *SMELL*. The parallel auditory perception of the nasals and their correlation with a continuous, echoing voice was met in terms for singing under 27. The N characteristic for smelling probably accounts for a numerical superiority of the nasals in a whole series of roots for thinking, mind, and related abstract notions; such a surprising numerical superiority can be found at a cursory glance at the 17th chapter in Buck's dictionary, under the title *MIND, THOUGHT*. A further correlation exists between the N characteristic and looseness or slackness, which is based on the perception of the loose velum with a weak closure against the oral tract; this meaning of the nasals is erroneously regarded as their principal, if not unique 'natural' meaning [19], 408, but its statistical significance could be demonstrated on the nasal infixes of the Indo-European roots rather than on the roots themselves. The combined perception of the loose velum and of its vibration, obviously accounts for the N characteristic or rather the specific *NR* characteristic in the radical morphemes for snoring. (Snoring is also frequently imitated with the specific *KR* characteristic, and here the *K* characteristic refers to the perception of the pharynx.) The N characteristic can denote further a pronounced muscular release of the velum in moments of physical pleasure and this leads again to new morpho-semantic correlations. E. g., in this connection the nasals occur in the radical morphemes for laughter; on the contrary the presence of nasals in roots for grinning and mocking, as well as in the roots for snarling and growling, is based in part on the auditory perception of these phenomena and in part on the perception of the stretched velum combined with the perception of the widened nostrils in a mimic grimace. We find also the N characteristic in the imitations of a third phenomenon opposed to both preceding ones, i. e., in the imitations of the mimic expression of rejection and »snobbery«; in this case the reason for the use of nasals is in the perception of the narrowed nostrils and the contracted raised velum. As we can see the number of tactile and proprioceptive perceptions related to the extra-linguistic phenomena in the area from the velum to the nostrils is very great: all this is imitated by the N characteristic which is in individual cases defined with specific N combinations. Just as at the general survey of the highly varied morpho-semantic correlations of the *R* characteristic, here as well we cannot pretend to be exhaustive. We have merely indicated a wide sphere of the 'natural' meanings of the nasal characteristic; this area extends far beyond the area of its significant correlations and should be investigated statistically.

In this study we did not take into account the particular perception characteristics of the individual nasals: e. g., the phoneme **M** — owing to its additional perception of closed or closing mouth — is often correlated the phenomenon of closing. The synergism between the closing of mouth and eyes or rather lips and eyelids probably accounts for the **M** characteristic in the denotation of the closing of the eyes and the related phenomena of indistinct light, twilight, or darkness. This **M** characteristic is found alternatively or together with the already mentioned **R** characteristic for the same phenomena. The synergism as the basic reason in the imitations with **M** appears also in the preferential combination with the vowel **I** characteristic which — starting from the perception of the lengthened, stretched lips, raised tongue, and stretched velum [34], 102 — just as well refers to the phenomenon of pressing. The **M** characteristic in combination with the vowel characteristic **U** is found in the same sense in the generally acknowledged imitative radical morpheme μ^* . In a parallel way we may compare also **KN** in Lat. *cōniveo* from IE *kneigh-*, Grk. *skniphos*, *skniphaios* from IE *ken-*, *sken-*, and Grk. *knéphas*, which all relate to pressing the eyes together and to darkness. The »expressive« **N** characteristic and the **I** or **J** characteristic are treated by V. Machek [35], 10—60. The role of narrowness or width in the pharyngo-velar sphere of the organs of speech and the role of nasality in the »sublinguistic phonic expression« is studied by F. Trojan [36], and [37]; but he erroneously claims that the sublinguistic and at the same time the prelinguistic phonic expression has no connection with the construction of linguistic systems; the root material of the Indo-European languages points to the contrary.

37. In our reconstruction of the **R** and **N** imitations we were irrespectively of the limited space somewhat longer — in the wish to show at least by means of two different examples as clearly as possible the method used in the explanation of the various statistical results; at the same time we wished to draw attention to the numerous supposed morpho-semantic correlations which although not yet statistically examined show a considerable degree of probability if we view them as parallels or oppositions to the significantly demonstrated correlations. With the following reconstructions we shall have to tackle the most difficult problems of the Indo-European imitative system. A great deal of time and space at our disposal will be occupied as much by the exposition of general linguistic facts and the description of the imitated real phenomena as by the necessary comparisons and the corresponding logical conclusions. So we shall make broader comments on the less transparent but most important instances of imitation only, omitting a near explanation of the repeated or slightly varied imitations which might be with regard to the former easily understandable.

38. **Imitations with central oral consonants.** In the perception of the speakers belonging to the Indo-European community the sound **R** differed from the remaining sounds in the manner of its articulation, which was interrupted; while the sounds of the **N** type were in the perception of

the speakers defined above all by the restriction to a particular articulatory area, i. e., to the velum and the nasal tract. Locally well defined in the consciousness and in the subconsciousness of the speakers were also the sounds of the type **K** and the sounds of the type **P**: the former because it relates to the throat in the broadest sense of the term, from the larynx to the back part of the tongue and the velum; and the second because it relates to the lips and cheeks. This follows clearly from a morpho-semantic analysis of the traditionally acknowledged Indo-European onomatopoeias and of the radical morphemes with significant phonemic characteristics in our statistical material. For the sounds that are in their final form represented by the Indo-European phonemes **S**, **L**, and **T** it is less evident whether and how they were perceived by the speakers. Here we have to reckon with the biggest changes from the pre-Indo-European to the Indo-European period. Under 34 it was already stressed that at least some of the phonemic characteristics of **S** have to be traced back to the preceding pre-Indo-European form of that phoneme if we want the significant morpho-semantic correlations should be understandable. The same applies also to some phonemic characteristics with **L**. The interpretation of the imitations with the **T** characteristic may seem easier, as in the semantic analysis of the corresponding radical morphemes these imitations seem to be naturally founded through the perceptions located at the front part of the tongue and at the palate, including the alveoli and the teeth. Yet the sounds of the **T** type — from the point of view of their articulation and of the role they played in the genesis of speech — are so closely associated with the sounds of the type **S** and **L** that we can attempt their explanation only after reconstructing the imitation processes hidden behind the **S** and **L** characteristics.

39. The articulatory interconnection of dental, lateral and sibilant sounds consists in the fact that all of these are articulated predominantly in the central part of the organs of speech, i. e., in the oral cavity in the precise sense of the term, and that they are produced with strong movements of the front and middle part of the tongue. They are opposed to the gutturals and labials on the one hand and to the nasals (excepted the dental nasals) on the other. The gutturals and the guttural nasals are — beside the opening of the lips — produced in the back of the organs of speech, in a continuous tract reaching from the larynx to the nostrils; the tongue is involved only with its back part or is not participating at all. The labials and the labial nasals are — the velum and possibly the nasal tract participating — produced in the frontmost part of the organs of speech with the compression of the lips; the tongue is here consistently uninvolved [15], 419. In this way with all the enumerated sounds, the gutturals, labials and guttural and labial nasals, the central part of the organs of speech is not involved in the articulation.

40. From the observation of speech development in childhood we know that the predominant majority of the consonant sounds independently produced by the child in the first months of its life are laryngeal and velar

sounds, that is in our terminology gutturals [38], 415, 416; [39], 374. We might add that along with these occurs the pharyngeal R [R], 13, 177. If »deaf infants go through the first of babbling just as normal infants do, and it requires no experience of language for its onset not for its maintainance during the first stage« [41], 524, we may take that this is obviously a case of old sound inheritance. These sounds, produced in the back of the organs of speech later disappear, and when the baby starts learning the language, imitating the sounds of the adults, the labials produced in the opposite front part are the first to appear [39], esp. 356 iff.; [42], 77, 151. So we may say that the sounds produced in the central part of the organs of speech are the last from the phylogenetical and ontogenetical view. This is confirmed also by the observation of the anthropoids. The consonant system of the chimpanzee's »speech« consists only of gutturals, the pharyngeal R, and the nasals; when captured by man the chimpanzee among other things learns to imitate the human labial sounds but it cannot imitate the sounds requiring strong movement of the front or of the central part of the tongue, either perhaps because of an inappropriate anatomic structure of the tongue and of the oral cavity [43], 391—397; [44], 654—658, or because of a different nervous system [45], II, 40.

41. On the other hand it is known that the linguistic function of the organs of speech is a secondary function or »parafunction« derived from the primary, elementary functions of these organs. This is emphasised already by E. Sapir [46], 8, and M. Grammont [19], 22. Similar findings have been made by the more recent authors; they stress particularly that from the motor point of view beside the respiration, vital and phonic—which is especially the basis for the production of vowels—the main source of the linguistic function is the use of the same muscular effectors as with nutrition (chewing and swallowing), and that particularly as regards the articulation of consonants [27], 133. A closer analysis of the movements during feeding and during speech has been carried out, and a limited number of primary pharyngo-buccal stereotypes have been established, which in both cases are almost identical [15], 418, 419. From this it would follow that for instance the labials owe their articulation foremost to the opening and closing of mouth when seizing food, and the gutturals their form to swallowing; along the same line of argument the chewing of food in the mouth may account for the shaping of the articulatory movements of the consonants produced in the central part of the speech organs. And since it is difficult to imagine that the process of the shaping of the articulatory movements on the whole and the mental process of the symbolic representation of the reality through these movements should have been developing independently, we may expect that the terms for feeding in various languages of the world will show traces of parallelism between their semantic contents and the specific articulatory movements originated by the movements of feeding. The root material of the Indo-European languages reveals such traces: the phonemes of the type P denoting the seizing of food (pap(p)a-, kap-, ghabh-) and phonemes of the

K denoting swallowing (gel-, g'wel-, g'wer-, slrg-, (s)leug-). The phonemic characteristic NN found in the meaning for chewing, i. e., rather in the meaning of the passing of the chewed food into the larynx in contact with the velum (menth-), was already discussed under 35; there are several other radical morphemes, referring to feeding, with a single N characteristic (meit(h)- and pen-, mad-, (s)nā-, nes-). Yet the velum participates only at the end of the chewing, and so we could expect that in the radical morphemes denoting chewing we shall find mostly the sounds produced in the central part of the speech organs which are represented by the phonemes of the type **T, L, S** in our statistical population. Such a hypothesis being true may lead us to a more sure reconstruction of the imitation processes underlying the significant phonemic characteristics **T, L, S**.

42. In the synonymic sets 5.11 eat, 5.12 food, and 4.207 jaw (*Linguistica* VI, 18 and VIII/1,10) we find in fact beside the nasal characteristics also dental, lateral, and sibilant characteristics in the same or in other morphemes, as this can be seen from the instances already quoted; but from the average number and from the not uniform structure of the roots with such characteristics we cannot infer a reliable reconstruction of the imitation pattern: chewing — the perception of chewing: the perception of the phonemes **T, L**, and **S** or of their predecessors — these phonemes. Above all it seems that these terms for eating, food, jaw and related phenomena contain imitations of all phases of feeding, i. e., imitations of grasping food, chewing, and swallowing it. Besides, the formulation: chewing — sounds produced in the central part of the speech organs is obviously too narrow. The probable source and the imitation object of the central oral consonants is not merely chewing but also the parallel physiological processes of tasting, sucking, sipping, and drinking. The role which tasting (with chewing) has in the formation of the speech sounds, has been treated by several authors; an interesting experiment has been made in this connection [47], 64—66; a possible role in the ontogenesis of the infant's speech is assigned to sucking, particularly in connection with the labials [39], 374. But to our knowledge no examination has been made of the motor and sensory patterns of sucking, sipping, and drinking in the phylogenesis of the human speech, and also the imitations of these phenomena have been examined in passing only. In the present study we have tried to make up for this last deficiency, and in the concept group **SMELL, TASTE, SUCK** we have included beside the terms denoting smelling and tasting all the synonymic sets from Buck's dictionary which refer to sucking, sipping, and drinking. In this concept group we get a more clear picture of the correlation between the central phase of feeding and the central oral consonant as in the case of the synonymic sets of eating, food, and jaw included in the concept group **NARROW**.

43. To allow the necessary comparisons we give a short outline of the related physiological functions, first of chewing. When through the open mouth food comes into the oral cavity and the mouth closes, the tongue is stretched out to get hold of it; the lateral edges of the tongue are raised and

in the middle the so-called palato-lingual channel is formed. In this channel a mouthful of food is shaped, which is precedingly crumbled by the teeth and the closing lower jaw; the tongue presses on it with its front part, upwards and from both sides towards the palate, and pushes it backwards; finally the mouth being closed, the back part of the tongue is raised and throws the mouthful into the pharynx. In doing this the chewing muscles which elevate the lower jaw get contracted, and with them also the muscles of the floor of the mouth. Some raise the tongue bone and in this way the whole tongue, while others pull it back and at the same time narrow the passage into the pharynx (isthmus faucium), which is formed of the velum and the bi-partite pharyngo-palatal arch. When the mouthful touches the passage, the passage opens like an iris and allows the mouthful to pass, upon which it is closed again [48], 273—274.

The purpose of tasting is to secrete saliva which is indispensable for chewing and digesting. The specific sensation of taste is produced through the action on the taste buds of the substances solved in the saliva. The taste buds for the pleasant (positive) sensations of sweet and salty are located on the tip of the tongue and on the front parts of the lateral edges; the taste buds for the ambivalent sensation of sour are on the middle part of the lateral edges; while the taste buds for the unpleasant (negative) sensation of bitter are — most likely not without reason in the area where the reflex mechanism for vomiting is situated — on the base of the tongue so that in this way the rejection of unpleasant or unsuitable food is made possible [48], 279. In order to achieve in feeding a maximum salivation and an optimal taste perception it is necessary that the solved substance comes into touch with as many sense cells for pleasant taste sensations as possible; accordingly, with tasting the chewing movements of the front part of the tongue upwards toward the palate are accompanied by strong movements of the tongue downwards to the floor of the mouth and by a simultaneous bending of the tongue edge downwards so that the solved pleasant substance can flow over them.

At the normal drinking of adults the same movements are involved as at chewing. It differs slightly from it that the front part of the tongue at its pressure upwards does not move to the right in to the left, since here it is not necessary to shape a mouthful. A greater difference is found at sipping, accompanying mostly the initial phase of drinking. With the opening of the mouth there is a simultaneous inspiration of air through the oral tract in order to convey the liquid into the palato-lingual channel; to this aim the lips are protruding and the tongue produces a sucking movement down and backwards. The sucking — as an inherited biological function of infants — consists just of these movements of tongue and lips, but at the same time also the lower jaw is considerably retracted — on the average 15 to 20 mm — in milking the teat of the mother's breast or a similar object and, as the entrance into the oral cavity is obstructed, lips and jaws remain open even in the final phase of swallowing. Consequently, the back part of the tongue cannot be tensed to thrust the liquid into the pharynx and the swallowing is

carried out merely by the combined pressure of the muscles of the floor of the mouth and of the muscles of cheeks and lower lip [49], 391—394, 569—577.

44. We return now to the question of the morphosemantic correlation between the central oral consonants and these phenomena. Under 42 we mentioned an experiment made by F. Trojan in which the speech sounds and the sounds produced in chewing and smacking were compared. Since the ultimate goal of the experiment was to verify the hypothesis about chewing aloud as the origin of speech ten subjects were asked to chew a bite of sandwich with open lips and in chewing to smack and grunt as they pleased. The acoustic effects produced in this way were recorded on a magnetic tape. It turned out that the sound »raw material« was composed of three main components: 1. labial and dental, mostly palatalized, click sounds; 2. sounds resembling *a*, mostly nasalized, but sometimes resembling *o*; and 3. the nasals *m* and *n*. If we compare the result of this experiment with the significant characteristics SN and SL-NL-TL in the concept group SMELL, TASTE, SUCK, and with the significant N characteristic in the synonymic sets 5.11 eat, 5.12 food, and 4.207 jaw in the concept group NARROW, we see that the imitations with the N elements faithfully represent the nasal manifestation of the phenomenon imitated. In chewing nasal sounds are really produced — by breathing through the nose by repeated mouth closure and by closing and opening of the oral cavity in the direction of the pharynx through the velum. With chewing aloud resonant nasals, with ordinary chewing non-resonant nasals are produced.

On the other hand the main acoustic manifestation of chewing and tasting is represented by the smacking, clicking sounds. Their production corresponds precisely to the sucking opening of the lips and the described essential movement of the front part of the tongue: with chewing upward towards the palate, and with tasting downward towards the floor of the mouth. A faithful imitation of these sounds and movements can apparently be found only in the click sounds existing for instance in some African languages, notably in the languages of the Bushmen. It seems therefore that there are only two possibilities for the explanation of the phonemic types S, T, and L in the Indo-European imitative radical morphemes concerning chewing and tasting: either these phonemes are a highly imperfect imitation of these activities or they are successors to sounds resembling clicking formed in the pre-Indo-European period.

It may be pointed out once more, however, that the experiment discussed deals only with chewing and tasting; a similar experiment for drinking, sipping, and sucking is unknown, while the significant S, T, and L elements in the concept group SMELL, TASTE, SUCK which are to be explained, occur also in the radical morphemes with these latter meanings. In the reconstruction of the imitation processes, attested in the Indo-European languages by the significant central oral consonants, it is imperative to take into account also the special movements and sensory perceptions inherent in the phenomena of the passing of liquids through the oral tract.

45. The essential difference between the perception of solid food in the mouth — although already substantially salivated and well chewed pulpy food — and the perception of the liquid food or any liquid in the mouth lies in the fact that in spite of the palato-lingual channel the liquids overflow its borders and come to the floor of the mouth whereas with solid food this does not occur. Here we may ask ourselves for the reason why the grammarians of Antiquity called the sounds L and R liquids and — taking L only — why with the explanations of linguistic imitation and of the origin of language we meet constantly the idea that the sound L is associated with the meaning of liquid. The outstanding French phonetician M. Grammont finds the denomination as »liquida« for all the various kinds of L fully appropriate: »at a certain point the tongue closes the middle line of the oral tract, the breath escapes on both sides of the tongue, and its glides through like a liquid which is flowing«. Considering in a special chapter of his book the impressive value of individual sounds, proceeding from their auditory impression, he says about L: »the sound L which as we have seen represents the sound of gliding and even more generally the liquidity in so far as it is accompanied by sound is just as appropriate for the representation of a not audible gliding and even of the state of liquidity.« And once more: »the combination of F with L combines the breath with the liquidity, and this gives the impression of fluidity« [19], 71, 408, 411. If we take into consideration that the speech sounds are perceived not only in an auditory but also in a tactile and/or proprioceptive way (Table IX), is it not most reasonable to assume that the above described impressive values of the sound L represent a consequence of its lateral fricative articulation which essentially distinguishes this sound from all other sounds appearing in the Indo-European languages? And is it not a further natural assumption that there is an objectively founded parallelism with the speaker between the perception of the lateral fricative articulation of the sound L and the perception of the liquid in the oral cavity, overflowing the edges of the tongue and reaching to the floor of the mouth?

That the tactile-proprioceptive sensations created in the articulation of L are located on the lateral edges of the tongue — not merely at the edge line itself but also below it on the lower side of the edges and at the floor of the mouth — can easily be proved by self-observation. For this purpose, it is advisable first to produce a non-resonant L so that the participation of the vocal cords in the voiced production does not distract the attention from the essential consonant articulatory features of L. The experiment may be best made even with an inspired non-resonant L, since with such production of this sound the air moves in the same direction as liquids when sucked, sipped, or drunk. This is not strictly necessary since the essential articulatory features which we are here concerned with are the same with the expired, resonant L. Whatever specific articulation of L we now decide upon, be it dental, alveolar, alveolar, dental-velarized or interdental [34], 106, 107, or an articulation with the front of the tongue pressed against the lower teeth, in each case it is clearly distinguishable that the air passes along the edges of the tongue and along the lower side of the edges, just as with

liquids flowing over the edges of the tongue and across the floor of the oral cavity.

46. The imitative mechanism which is based on the parallel perception of the physiological processes of drinking, sipping, and sucking seems to be in this way accounted for. But the gliding of liquids through the oral cavity is expressed in the Indo-European radical morphemes not only by means of the *L* characteristic but also by means of the *S* characteristic. It can be assumed that this characteristic in opposition to the *L* characteristic imitates the gliding of the liquid along the palato-lingual channel itself, and particularly the auditorily very perceptible simultaneous gliding of the air and liquid along this channel when the air is inspired during sipping. Thus the Indo-European etymological science itself explains, e. g., the origin of the radical morpheme *seu-* with the nominal meanings of sap and moisture and the verbal meanings of rain, trickle, curdle, suck: »*SU* originally seems to have reproduced the sound with which one sips a liquid« (WP 2.468). In the concept group *SMELL*, *TASTE*, *SUCK* the occurrence of this root shows a numerical superiority, and even more numerous are the roots with an initial *SW* where mostly the same or similar meanings come up. The difference between this imitative value of *S* and the outlined imitative value of *L* is obvious in the fact that it is the passing of air alone through the oral tract, which can be imitated by *S* — in meanings in which the idea of a liquid is excluded, as, e. g., in the synonymic set 15.84 *dry* — whereas there are no instances where *L* would reproduce the passing of air or breath only. The fact that the *S* imitations may refer to a liquid and to air forms the main basis for the significance of the general *S* characteristic in the concept group *SMELL*, *TASTE*, *SUCK*. In this way the imitations of drinking, sipping and sucking may be explained on the basis of their fricative features; on the contrary in the imitations of chewing and tasting discussed under 44 we had to assume preceding clicking forms of the *S* and *L* characteristics.

47. To establish the consistence of these two opposite explanations we start from the phonemic forms of the radical morphemes in the synonymic set 5.16 *suck*. Beside the normal Indo-European root *seu-* we find there in three languages or groups of languages root forms all containing the *U* characteristic, which replace the sibilant *S* with the affricate *C*; but other synonyms with *C*, e. g., *Boh. cucati* are omitted in *Buck*. In the course of this study (*Linguistica* IX/1,19) we have already supposed that an affricate consonant instead of a sibilant one probably represents a more archaic form of the same imitation. The question whether this is a preserved pre-Indo-European form or a reconstructed one does not concern us at this moment; it may be added that some notable Indo-European scholars in this case permit the possibility of a variation between *S* and the affricates *C* or *C** even for the Indo-European period [10], 31, 214. Here we want to stress

* *C* and *C** = *ts* respectively *ch* in the English transcription.

that sucking is more adequately imitated by an affricate than by a sibilant not as much on account of a greater similarity of the auditory impression as because the articulation of an affricate reproduces more closely the tactile and proprioceptive sensations of sucking. At each of the subsequently following sucking movements the front part of the tongue moves upwards from its initial position at the floor of the mouth and creates the palato-lingual channel; but immediately after that it moves down and backwards (see 43) while the liquid sucked in glides along the palato-lingual channel and flows over its edges. If we transpose these movements in the articulatory movements of the speech sounds, the movement upwards and down corresponds to the articulation of the dental, the sucking-in of the liquid through the palato-lingual channel to the articulation of the sibilant, and the overflowing of the liquid over the down bent edges of the tongue to the articulation of the lateral consonant. If a possibly faithful imitation is attempted, we might expect the sequence T — S — L, and in fact the Lithuanian and the Letton synonym *čiułpti* and *čiułpt* show exactly that sequence. The combination of the two movements, the dental and the sibilant one, gives here the affricate sound.

Beside this imitation there exist others largely without a lateral vocal element: Skt. *cus*ati*, Sp. *chupar*, Boh. *cucati*; but the affricates appear here just as well as there. Accordingly, essential for a more adequate imitation of sucking, i. e., more adequate than the one by means of fricatives, is the dental phonemic element which renders the movement of the front part of the tongue upwards and at least indicates the reverse movement of the tongue downwards at the point when the tongue returns to its initial position. That such movements of the tongue during sucking are distinctly perceived is demonstrated by further imitations in the set 5.16 with mere dentals; *dhē(i)-* and *titta-*, as well as by a parallel radical morpheme *g'eid-* with a dental sound appearing again. The role of the downward movements in the perception of sucking is still more obvious if we mention the occurrences of nasal characteristics in the radical morphemes *mā-* and *meu-*, which agree with the imitations of chewing already discussed under 35, 41, and 44 and which render above all the movements of the velum downwards. Just as the phenomena of sucking, sipping, and drinking can, on the one hand, be rendered merely by fricative sounds, so, on the other hand, they may be imitated by mere dental and nasal plosives; and, at the same time, an active tendency to combine the two characteristics can be observed.

48. The use of affricates and generally the use of T elements in the imitations resides in the wish to emphasize the palatableness of sucking, sipping, or drinking — i. e., not only the passing of the liquid through the oral tract but also a possibly intensive tasting of that liquid; the feeling of the palatableness equalizes in the consciousness these phenomena with the phenomenon of tasting. In fact, we find in the imitations of tasting a variation of the S characteristic with the C or Ć characteristic, as well as the occurrence of bare T characteristics. In the synonymic set 15.31 taste

(vb. subj.) we get for instance 3 radical morphemes with S (smeg(h)-, sap-, and g'eus-), 4 radical morphemes with T (dek-, teg-, ten-, and bheudh-), and 1 radical morpheme with NL (mels-). Of the nine roots taken into account the only root (ere-s-) that contains none of the sounds enumerated has a S characteristic in the extension; and of those not included in our statistical population there are two roots with the initial SW: swek- and swäd-. Almost the same distribution is to be found in the remaining sets 15.32 to 15.34 which directly refer to tasting and taste. Since the C and Č variants are not directly evident from the enumerated sets, a few words must be dedicated to them. In the concept group NARROW we get in the set 4.207 the radical morpheme smek-; but since, in addition to the meaning »jaw«, we find in this root the meanings »lip« and »palate«, it will — after the extensive discussion of the imitations of chewing and tasting — not appear strange if we regard this root but as a variant form of the root smeg(h)- with the same basic meaning »to taste«. This is suggested by the Slavic expressive variant of this root cmok- or lengthened cmak-, which appears in the meanings »eat noisily, champ«, »smack one's lips«, and »kiss«; thus we get in Slovene cmokati and cmakati (Plet.* 1.85, 86), while in Ukrainian we have cmakaty and in the palatalized form cjamkaty [50], 187. These meanings precisely correspond to the identical meaning in the Lithuanian and Germanic root smeg(h)-, which is found in the synonymic sets 15.31 taste, 16.29 kiss, etc.; the same meanings were conveyed or continue to be conveyed by the English term »smack«. Russian has Č in the place of C: čmokat' »smack one's lips«, »give smacking kisses«, and dialectically again the palatalized čmjakat' »smack one's lips«, »champ« (Vas. 3.344, 345). The etymological connection between the Slavic and the Germanic and Lithuanian terms is almost beyond doubt, as, in the Slavic languages, in addition to the expressive root form cmok- there is also a normal root form smok-, e. g., in Slov. smok »sap, pap, etc.«, smočen »sappy« (Plet.* 2.519, 520); in Russ. smoktat' »to suck in«; and in Pol. smoktać, smoknać »smack, eat or drink noisily« (Vas. 2.674). ChSl. smoky »fig« probably also belongs here, and there is no reason to assume a borrowing from a Germanic or any other language (Buck 5.75). Time and place do not permit a closer analysis of a further expressive variant with C or Č for S. These are Slavic root forms cap-, čap- or cab-, čab- as parallels to the normal Indo-European root sap-, sab-. In these variants, direct meanings of tasting or sucking are rather rare, thus for instance in Ukr. cjapati »to nurse, to suckle« [50] 185 — but we get a broad range of meanings of overflowing moisture or splashing, transferred from the mouth to other organs of the human body, which exactly correspond to the meanings of German words containing the radical morpheme sap-, sab- (FaT 941).

49. There is one more group of synonymic sets in the concept group SMELL, TASTE, SUCK which calls for special attention. These are 15.35 sweet, 15.36 salt (as quality), and 5.81 salt (as substance). In the set 15.35 we come

* Plet. = M. Pleteršnik, Slovensko-nemški slovar, Ljubljana, 1894.

not only across two roots with SW (swek- and swād-) which combine the S characteristic with the labial characteristic W, but also in three of the remaining four roots across the L characteristic (sal-, mel-it, and dl*ku-, and in one across the nasal-dental characteristic NT (medhu-). In the sets 15.36 and 5.81 we have in each case two L characteristics (sal- and leu-) and one S-U characteristic sū-ro- respectively eus-; outside this sphere there remain only two R characteristics (g'w'her- and dhreu-). Although, owing to the small number of the occurring roots, it is not possible to calculate separately for this group of sets the significance of the numerical superiority of S and L in addition to that of W and U, their accumulation can hardly be due to a mere coincidence. Of the total 15 roots in all three sets there are 11 roots with either an L or an S characteristic; and still more important is the fact that these two phonemes are articulated at precisely those places where the taste buds for tasting sweet and salty are located. That »saliva« is the basic meaning of the root sal- and not »grey« (WP 2.453) is demonstrated by the many synonyms for saliva containing the root forms (s)lei-, (s)leu-, (s)lēb-, sap-, sei-, and (s)p(h)yēu-, and the unknown root from the Grk. sialon in all likelihood also begins with S or T. If, on the other hand, we look at the phonemic distribution in the sets 15.37 bitter and 15.38 acid, sour, among the total 20 roots there are as many as 9 which contain the K characteristic in the root itself and 2 in the extension (reu-g-); and this number raises from 13 to 20 if for the Ir. serb »bitter« and NIr. searbh »bitter, sour« we accept Pedersen's etymology ksā- instead of Pokorny's swer-. Just as with S and L for sweet and salty, here again we come across an agreement between the perception of phonemes and the perception of the phenomena denoted: the phonemes of the type K (as well as of the uvular R) are articulated at the same place where the taste buds for the taste of bitter are located and in the vicinity of the area containing the taste buds for the taste of sour (43).

But for a final reconstruction of the imitation processes which form the basis for the occurrence of central oral consonants in the terms for tasting and sucking or for palatable sipping and drinking, the most important fact is that in the corresponding roots we again come across T elements. Particularly significant is the root dl*ku- which appears in the Greek and Latin synonyms for sweet. Under 47 and 48 we have established the combination of the elements TS, this time we find the combination of the elements TL. The role of T in this combination is identical to that of the affricates: T renders the movement of the front part of the tongue upwards and indicates the reverse movement of the tongue downwards. But what is the role of the lateral? This role for itself is identical with that found in the Baltic synonyms čīulpti, čīulpt for sucking: to denote the touch of the liquid, i. e., of saliva in our case, on the lateral edges of the tongue. But there is a considerable difference in the structure of the radical morpheme. This difference is twofold. First, there is no S here. Since S is articulated in the palato-lingual channel, imitating the transition of liquid or air, and since, on the contrary, L is articulated outside the palato-lingual channel on the edges and under the edges of the tongue, imitating only the transition of

the liquid, the representation of the liquid is more distinct in the production of the phonemic combination **TL** than in the production of the phonemic combination **TS**. Secondly, here **L** directly follows **T** and the special imitative value of the combination **TL** in contrast to **T-S-L** lies in this very circumstance. When discussing the **N** characteristics under 33 we could already see that the imitation process with the complex characteristic **KN** could only be understood if we assume that originally the two elements **K** and **N** directly followed one the other. In the interpretation of the affricate characteristics we came across the same circumstance: the imitative value of the affricates depends on that in one articulatory movement the **T** element is followed by the **S** one. And this now recurs in the direct sequence **TL**.

50. Just as in the sets 5.16 suck and 15.31 to 15.34 taste it is also in the set 15.35 sweet that we find the characteristic **T** without **L** — this time in the radical morpheme *medhu-*. Thus, if we go on tracing the established parallelism between **TL** and **TS**, we may establish that the **T** characteristic in *medhu-* stands in opposition to the complex characteristic **TL** in *dl*ku-* precisely in the same way as under 5.16 the **T** characteristic in *dhē(i)-* is opposed to the complex characteristic **TS** in *Skt. ču-* and as under 15.31 *ten-* or *tem-* in *Bret. tanva* to the *Russ. čmjakat'* (see 48). And just as, in the set 5.16, we get additionally the simultaneous occurrence of the characteristics **TS** and **S** in the roots *ču-* and *seu-*, so in the set 15.35 we get the simultaneous occurrence of the characteristics **TL** and **L** in the radical morphemes *dl*ku-* and *mel-it*. The whole of the varying phonemic characteristics may be presented in the following way: under 5.16 and 15.31 **TS:T:S**, and under 15.35 **TL:T:L**.

This has brought us very close to the final solution of the problem what imitation processes and what sounds are hidden behind the significant characteristics **S**, **L**, and **T** in our statistical material. If, for the imitations with affricates of the type **TS**, we might perhaps question the Indo-European or even pre-Indo-European origin, we cannot do this for the imitations with **TL**; the same direct phonemic combination appear for instance in the radical morpheme *dhlas- »compress, squeeze«*. The primary nature of the variation **TL:T:L** points to just the same primary nature of the parallel variation **TS:T:S**. The two variations have a common feature: the imitations with direct phonemic combinations **TL** and **TS** are more perfect than the imitations with mere **T** or mere **L** or **S** which render only partial movements of tasting and sucking and reproduce only one part of the tactile-proprioceptive perceptions called forth by the denoted phonema. This common feature of a greater perfection points, it appears, to an early origin of the imitations with complex characteristics since it is improbable that, in a later phase of the development of the language, the imitation should be more exact than in an earlier one. On the basis of the observation of historical development of sounds it is also much easier to assume a transition of direct phonemic combinations **TL** and **TS** into **T**, **L**, and **S**, than a reverse process. But for such a development of sounds — except for the transition of a secondary

affricate before a dental into S [31], 179 — there is no known instance in the Indo-European phonetics. This difficulty is overcome if we take the assumption that TS, T, and S are derived from dental and palatal and TL and L from lateral clicks or click-like sounds. In this case the development of the pre-Indo-European sounds can be reconstructed, the connection between the movements of nutrition and the movements imitating them becomes evident, and — what has not been mentioned so far but is of a most decisive importance — this explains the major part of the various meanings of the roots with central oral consonants the source of which would otherwise remain enigmatic.

51. In his study »The Evolution of Click Sounds in Some African Languages« R. Stopa demonstrates on copious material how a series of African languages have developed front and central oral consonants, formerly missing in these languages, from the so-called click-blocks, i e., from clusters of preceding clicks and following — ejective or injective or also expiratory — gutturals. Thus, for instance, the ejective t' has developed from the cluster of a dental click and ejective guttural plosives and affricates*, and the expiratory t from the cluster of a dental click and expiratory guttural plosives. The ejective s' and ts' have developed from the cluster of a dental click and the laryngeal affricate 'h, and the expiratory s and ts from the cluster of a dental click and the laryngeal fricative h. Additionally, the expiratory ts has developed from the cluster of a dental click and the glottal catch, or from a dental click and plosive or affricate gutturals. Analogous phonemic combination of the palatal click have given tš', tš, and š. The development of the lateral click is especially interesting. It has led: in combination with the guttural ejective affricate to a lateral ejective affricate ** (n)tl'; in combination with the voiced g to a lateral voiced affricate (n)dl; in combination with the laryngeal voiceless h to a lateral voiceless fricative hl; in combination with the velar nasal (in the pronunciation of the English ng) to a lateral voiced l. The introductory n which comes up here is to be explained by the fact that the articulation of clicks is supported by an active closure of the velum towards the oral tract, and, therefore, in front of the clicks and their transformations there may also occur the production of a nasal [51] esp. 33—39, 12—13. In languages using clicks the role of the nasals is on the whole very great as, in the earliest stages of these languages, they represent the only consonant class beside the clicks and the various gutturals. All other kinds of sounds are in »statu nascendi«, have a very low frequency, and are mere allophones without a phonemic value of their own. These are the findings of R. Stopa in his second large study which we have already quoted [43] 437. We might add that the nasals occur also immediately after clicks and are, as regards these two different possibilities of position equal

* ' behind the sound is here a sign of the ejective production of the sound i. e., of closed vocal chords and raised larynx in the production of the sound — and not as otherwise in the present study a sign of the palatal quality.

** The designation affricate for tl and dl is by R. Stopa.

with the vowels; while, on the contrary, gutturals can only follow clicks but not precede them.

52. It is not our purpose to transfer the conclusions arrived at in the study of African languages mechanically to the Indo-European languages. Irrespective of the fact that it is not known to us whether all the African scholars agree with the above exposition, merely with respect to the open question of the monogenesis or polygenesis of the languages of the world it is impossible to claim a genealogical connection between language phenomena in two topographically so widely separated areas. If we stopped a bit longer at the description of the development of African sounds this was done in order to point out the genuine possibility for the development of oral consonants from clicks or click-like sounds and — in spite of the distance between the languages — the surprising similarities in the final results. These similarities are evident from Table XV which was composed on the basis of the phonemic distribution of the concept group SMELL, TASTE, SUCK. Beside the significant phonemic characteristics in this group: S, SN, SL, NL, and TL, the Table brings other characteristics with the central oral consonants, and all these characteristics are illustrated with corresponding radical morphemes. The roots seu-, ču-, dhē(i)-, mā- are found under 5.16 suck; the roots smeg(h)-, nes- under 16.29 kiss; the roots dn*g'hū-, mel- under 4.26 tongue; the root (s)leig'h- under 4.59 lick; the root mels- under 15.31 taste; the root mēgh- under 9.98 try; the roots mel-it-, medhu-, dl*ku- under 15.35 sweet; the root leu- under 15.36 salty; the root melg'- under 5.86 milk; the root lat- under 5.93 beer; the root las- under 16.62 desire; and the roots (s)nā-, smel- under 15.21 smell. Many of these roots occur in several of the enumerated sets as well as in other synonymic sets, and the presented examples may therefore be considered representative. Of the roots included, the Slavic »expressive« root cmok- belongs to 16.29, the root lendh- because of the Nlrlonn »alek« to 5.53, and the root lem- because of the Lith. lemoti »long fork« to 16.62. Although for »saliva« and for »leech« there are no synonymic sets in Buck's dictionary, the root sleu- in Icel. sludda »spit, mucus«, and the root demel- in Gr. dembleis (pl.) »leeches« naturally belong to our morpho-semantic area.

To enable comparison with these radical morphemes Table XV first brings the linguistic transpositions of dental and alveolar clicks which speakers of modern Indo-European languages still use today in addition to their normal speech. Further, the Table gives some words for clicking and smacking noises. The terms smekk, cmok, mlask, schnalz, losk, lusk, tlesk, dlesk directly refer to (smacking one's lips and) clicking with the tongue, this being the basic meaning of all these terms. The English words lash and slash refer to sharp, whipping sounds. The real nature of these sounds is shown in whippoorwill, the name for an American bird allied to goatsucker (Caprimulgus); the sucking sound of this bird is identified with a whipping sound. The German dialect word schnuckes is one of the many synonyms for a loud kiss, just as the English smack and the Slovene cmok. The Nor-

TABLE XV*
PHONEMIC CHARACTERISTICS

NASALS	NS	N	NK	NLS	NL		NLK	NT
SIBILANTS	S	SN	SNK	SNL		SL	SLK	
AFFRICATES	TS		TSNK					
DENTALS			TNK	TNL	LNT		TLK	T
LIQUIDS	LS			NL-T	LN	L	LK	LT

SOME EXAMPLES OF RADICAL MORPHEMES

NASALS	nes-	mā-	mēgh-	mels-	mel-		melg'-	medhu-
SIBILANTS	seu-	snā-	smeg(h)-	smel-		sleu-	sleig'h-	
AFFRICATES	ču-		cmok-					
DENTALS			dn*g'hū-	demel-	lendh-		dl*ku-	dhē(i)-
LIQUIDS	las-			mel-it-	lem-	leu-	leig'h	lat-

SUBSTITUTIONS AND WORDS FOR CLICKING SOUNDS

NTS! ¹	SMEKK ⁴	MLASK ⁷	LASH ¹⁰	SLASH ¹³	TOH! ¹⁶
TS! ²	CMOK ⁵	SMELL ⁸	LOSK ¹¹	DLESK ¹⁴	TTT! ¹⁷
TUTS! ³	SCHNUCKES ⁶	SCHNALZ ⁹	LUSK ¹²	TLESK ¹⁵	TUT! ¹⁸

wegian term *smell* has a fairly broad semantic range; it means »a smack, a slap, a bang, a crack, a flick«. Its origin is indicated by the fact that Old English has two related words: *smiell* — »a smack, a slap«, and *smiellan* — »to flick« whereas in Middle English and New English there are verbs and nouns from the root *smel-* in the meaning of smelling. As smelling and tasting are often rendered by the same words, an old meaning »smack one's lips and click with the tongue« emerges also in this case.

53. First to be underlined is the fact that the substitutions of the clicks and the terms for clicking sounds in the Indo-European languages contain, beside the optional nasal characteristics, the same phonemes and phonemic combinations which in African languages originated from clicks or rather combinations of clicks. The substitutions and the terms have been taken from the nearest, most accessible Germanic and Slavic languages, but they could be complemented by a broader material, especially by the corresponding Lithuanian interjections as found in the well known Leskien's study [54]. It is hardly to be believed that the established agreement should be accidental. The second thing to be underlined is the fact that the phonemic structure of the substitutions for clicks and terms for clicking sounds is in exact agreement with the phonemic structure of the representative radical morphemes of the concept group *SMELL, TASTE, SUCK*. For this new agreement it is even more difficult to claim that it could be accidental. Everything is interconnected: the similarity of clicks to the movements and sounds of chewing, tasting, sucking, sipping, and drinking and their direct origin from these movements [51], 55; [43], 458, 466; [55], 241; the transition of clicks and their combinations into central oral phonemes in the accompaniment of nasals; the simultaneous occurrence of these phonemes in the substitutions and in the terms for clicking sounds, and also in the so-called »normal« Indo-European roots for chewing, tasting, sucking, sipping, and drinking. As regards the appearance of dental clicks in the chewing and tasting of solid food we may again direct attention to the experiment mentioned under 42; and the occurrence of lateral clicks beside the dental ones when tasting, sucking or sipping a liquid can be verified by the reader himself. Thus we can finally complement the imitative and genetic pattern, given under 50, and formulate it as follows: dental (or alveolar) and palatal clicks — *TS* : *T* : *S* on the one side, and lateral clicks — *TL* : *L* on the other.

* The radical morphemes in broad letters appear in the concept group *SMELL, TASTE, SUCK*. Of the six interjections which transcribe dental or alveolar clicks Nos 2, 3, 18 are English, No 1 is Russian, No 16 Italian, and No 17 French. *Tut!* and *tuts!* are reported by the Oxford English Dictionary, *ts!* is used by Th. Dreiser in his novel »An American Tragedy«, while the French *tti!* is quoted by J. Vendryes [52], 13, and the Russian *nts!* by V. K. Nikolaiev and N. F. Jakovliev [53], 22. Among the words for clicking sounds there are — besides the two English verbal forms: *lash* and *slash* — substantives only which can be mostly used as interjections also. The Nos 4,8 are Norwegian, the Nos 6,9 German, and the Nos 5, 7, 11, 12, 14, 15 Slovenian. All of them are discussed in the standard and etymological dictionaries; the German dialectal *schnuckes* is quoted by Kluge-Mitzka under the entry: *Kuss*.

54. Though we would like to avoid broad polemics with the opposing viewpoints called in question by our interpretation of the imitation processes hidden under the significant value of T, S, and L characteristics, we must at this stage point out more decidedly than so far the fundamental mistake in the usual conception of the onomatopoeias. The reason for this is that for almost all the terms from No 4 to No 15 in Table XV etymological dictionaries say that these are mere isolated onomatopoeic words in individual Indo-European languages and that they have no genetic relation with the Indo-European »normal« roots given above. If this were true, one of the essential links in the chain of our arguments would drop off, and the way from clicks to Indo-European roots would appear much less convincing. The fact is that so far scholars studying the etymology have misconceived the essence of the linguistic imitation in the roots declared by themselves as imitative ones, and have misunderstood their relation to the so-called normal roots precisely because they are convinced that the only possible linguistic imitation is the acoustic imitation and in the particular assumed instances they have not objectively verified it.

Under 14 we have already emphasized that it would be imperative — before a particular word is declared to be an imitative one — to examine objectively the similarity between the word and the phenomenon denoted by it, taking into account its determinedness by the system of the language to which it belongs [56], 152. If the word is declared as an acoustically imitative one, it would be imperative beforehand to prove its acoustic conformity. **Unless the acoustic similarity has been objectively established it is not possible to claim that the word under consideration is acoustically imitative irrespective of the subjective impression.** In this way one might demonstrate a certain acoustic similarity between a term containing an affricate, like the Slovene *cmok*, and a dental click accompanied by a nasal; it would be harder, though, to prove such a similarity for other terms in our table which contain beside nasals only T, S, and L. But it would be especially hard to prove — and here we are at the core of the problem — an acoustic similarity between the terms from No 4 to No 15 in Table XV and the phenomena of various blows denoted by them. The acoustic spectra of the noises created by those blows would be probably sensibly different from the acoustic spectra of the corresponding terms and, on the basis of this alone the claim for acoustic imitation would have to be dismissed in these cases. It is obvious that, so far, such a verification has not been done, and until it has been done our rejection of subjective etymological assumptions remains justified. This practice, by the way, is based not only on subjective impressions which are certainly given — having their cause in the interdependence of sensations — but at least as much on wrong premises. In addition to the generally known attitude that in the language there is no intrinsic connection between sound and meaning, there exists also an old attitude (but specially elaborated by the neogrammarians in the last quarter of the previous century) that if, by way of exception, we get an instance of linguistic imitation, this is an acoustic imitation [25], 177, 182*. We cannot but look for a motive for

the consistent adoption of such a view. Since, in reality, the number of auditorily perceived phenomena is relatively small in comparison to the total number of the existing phenomena, it is in this way possible to withdraw the basic mass of the linguistic morphemes from the suspicion of the imitative origin — which would degrade the sense of human dignity obviously afflicted by the theory of evolution. But if such a subconscious argumentation of these attitude was understandable a hundred years ago, holding on to it today is in opposition to the generally accepted theory of evolution. Saussure's comparison of the language to an artificial coding system in which the signs are merely externally related to the content certainly represented a fresh impulse for the linguistics in the encounter with the technical examination of communication. Nevertheless a complete identification of language with an artificial coding system is wrong at its present stage already; and it is all the more wrong for the language as such and particularly for its beginnings. We feel certain that the results of the structuralist studies can be very well combined with the results of the studies concerning the intrinsic connection between sound and meaning if we admit that both, the element of the external, i. e., the younger, connection as well as the element of the intrinsic, i. e., the older, connection between sound and meaning continue to be present in the human speech even today.

In the present study our attention has been concentrated on the older, intrinsic connection between the linguistic sign and its content, on the physiological explanation of such a connection and on its genesis. This cannot come in the first place from the listener, it, on the contrary, comes from the speaker — not merely from man's auditory perceptions but from his total perceptive faculties and his total sensual and emotional inner world. A whole series of arguments and sources has been mentioned here to demonstrate the great role played in man's experience of the reality by the tactile and proprioceptive senses, which are twofold perceptions [22], 29, and directly relate man's inner and external world. Let us additionally quote the opinion of the well known writer and philosopher J. P. Sartre as stated in one of his philosophical-scientific works. When he speaks about the closest connection of the kinaesthetic and tactile perceptions with the visual and auditory ones, he says: »We think that the 'visual' and the 'auditive' human types are only people who are not capable of good self-observation and who have not recognized the right word for the visual or auditive image which is movement.« And at another point he says: »Thus a few years ago, when we tried to imagine a swing moving here and there, we had a distinct feeling that we were softly moving our eyeballs. Then we tried to imagine the moving swing once again and this time to keep our eyeballs immobile. We forced our look to be fixed at the number of a page in a book. This time the following happened: either our eyes started moving despite our wish, or it was not possible in any way for us to imagine the swing moving [57], 112, 108.

* Also where a parallel articulatory imitation is admitted as, e. g., with the roots pŭ-, kap- etc. this imitation is considered to be subordinated to the acoustic one.

What has been established about the mutual relation between the visual and tactile-proprioceptive perceptions and images — namely that, especially when referring to the phenomena of movement, they are indissolubly connected — applies just as well to the mutual relation between the auditory and tactile-proprioceptive perceptions and images. The auditory perceptions of one's own chewing, tasting, sucking etc., as well as of the clicks and other phonemes symbolizing this, depend on the perceptions of the movements and touches that occur — and the same dependence exists on the level of images. On the basis of exact experiments with doves the Italian physiologist P. Tullio has arrived to the conclusion that any acoustic impulse — no matter where it comes from, hence not necessarily from the producer of this stimulus — stimulates at the same time the auditory sense organs in the labyrinth of the inner ear and the organs for spatial orientation in the vestibule which make an exact analysis of the sound as to its direction, height, and intensity; all these qualities call forth reflex movements of adequate duration, amplitude and intensity in various parts of the body. The same is true of the optic and tactile stimuli which in the same way give rise to corresponding motor responses in the body. Tullio claims that speech sounds and human speech result from such reflex movements [48], 258; [22], 70. No matter how much this physiological thesis may appear simple and attractive we are not qualified to pronounce a final judgement on it, and also we need not go as far. The possibility that the imitations are either conscious from J. P. Sartre's stand-point, or reflex, from P. Tullio's stand-point, does not affect the final result. For the explanation of the imitation processes dealt with it is sufficient to proceed from the speaker (15) and assume a direct transfer of the tactile and proprioceptive perceptions into the brain centres. P. Tullio's view has been quoted to show that there exists a supposition of an even closer mutual connection between the tactile-proprioceptive and auditory perceptions than it is necessary to give a satisfactory interpretation of our statistical significancies.

56. Probably nowhere in our statistical material the predominance of the motion element over the acoustic one is as obvious as in the significant characteristics containing T, S, and L. The decisive priority which clicks have in the imitation of the movements of nutrition lies in this that their articulation is in principle turned downwards and inwards [43], 346, 348—50; [55], 242, and in this way precisely corresponds to the most typical movements in chewing, tasting, sucking, etc., which go downwards and backwards; in the same two directions move also food and liquids through the oral tract. The tongue and the lower jaw move downwards and backwards, and downwards and backwards moves at the same time the velum. At the imitations by affricates the backwards direction is left out and replaced by the forward one; it is only the downward direction that is indicated. Only if affricates are articulated with inspiration, the backward direction is preserved; in this case it is also the auditory impression which is considerably closer to the auditory impression of clicks and natural noises during feeding. If in the

imitation an affricate is replaced by T, the movement downwards remains indicated, and auditorily the imitation is better again when T is articulated with inspiration. The imitations with S and L contain merely the tactile sensation of the air moving along the palato-lingual channel or along the edges of the tongue at the floor of the mouth; here, too, with inspiratory articulation the auditory articulation is more adequate and the tactile sensation which records the passing of the air inwards is similar to the proprioceptive sensation of the sucking movement inwards. We can see how important for the faithfulness of the imitation are the **articulatory directions in the organs of speech**. It seems to be certain that the mental conditions for the articulatory imitation of chewing, tasting, sucking etc. in the same directions preceded the conditions for imitations with inverted articulatory directions. But also when the imitated and the imitating movements agree in their directions the completeness of agreement is decisive. Thus with the inspiratory imitation the direction downwards is indicated only, while with the clicking imitation this direction is clearly pointed out, and therefore the clicking imitation is a more faithful one and in all likelihood genetically prior to the inspiratory articulation.

That in the distant pre-Indo-European period there existed a phonemic prototype of the Indo-European T, S, and L, which in its articulation and in its natural meaning contained a shift downwards and backwards, follows most clearly from a comparative semantic analysis of the terms for clicking sounds in Indo-European languages and of the analysis of »normal« Indo-European roots — those in Table XV and the corresponding homonymous and homeophonic roots. Homonymous are radical morphemes which have precisely identical phonemic characteristics and morphemic structure, and homeophonic are radical morphemes which have characteristics of the same phonemic type and a similar morphemic structure. With the terms for clicking sounds and with the »normal« Indo-European roots having the same phonemic characteristics we find in a mutual promiscuity oral meanings and the meanings »strike«, »fall« and »press down« — very often in a characteristic connection with moisture — which have their source in the movement and feeling: downwards; on the other hand the meanings »draw«, »sweep«, »wipe«, »slide«, »slip« which have their source in the movement and feeling: backwards or towards oneself; also the meanings »get slack«, »slide down« which have their source in both movements: downwards and backwards; and finally the meanings »dangle«, »hang«, »swing«, »totter«, »rock«, »move to and fro« which have their source in the repeated movement backwards. The fact that we find the same typical meanings in the so-called acoustic onomatopoeias in individual languages — which should represent more or less independent imitations — and in the »normal«, supposedly non-imitative Indo-European roots raises, in view of the identical phonemic characteristics, a justified suspicion of their actual isolatedness. We do not mean that all the terms for clicking sounds in Table XV are etymologically related just to the Indo-European roots in the same vertical line; the table was not arranged with that aim. But it appears highly probable that these

terms are consistently related to homonymous or homeophonic Indo-European roots. This essential conclusion which follows from the comparative semantic analysis is joined by another which is decisive for the genetic evaluation of the one and the other category discussed. **The promiscuity of the meanings of the terms for clicking sounds and of the »normal« Indo-European roots has a correspondence in the promiscuity of the simultaneous occurrences of the phonemic characteristics T, S, and L for the same meanings.** Thus we find the phonemic characteristic T, for instance, which does not contain the articulatory movement backwards, also for the meaning »draw«, and the phonemic characteristics S and L, which do not contain the articulatory movement downwards, also for the meaning »strike«. Such occurrences of the meanings can be explained only through an original phonemic prototype containing both articulatory movements downwards and backwards.

57. It is quite impossible, within the scope of our explanation which has already reached beyond the anticipated size, to make a detailed semantic and etymological analysis of the terms and roots from Table XV. This has been done only to the extent that was necessary for an understanding of the morpho-semantic correlations occurring in our statistical material. A linguistically educated reader will for himself be able to control the correctness of our statements in etymological and other dictionaries. An exhaustive treatment of all Indo-European vocabulary belonging here has to be preserved for some other time, since we must proceed now to supply an explanation still missing for some of the statistically established significances. First of all, we can now find a correct explanation of the imitation pattern for the phonemic characteristic SN which we came across in the concept group NARROW (34); the explanation according to which SN — beside the movement of the velum downwards when tasting — can also denote the closure against the nasal tract in the meaning of »narrowness«, cannot be maintained. In this case again the imitative value of SN relies on the perception of a closure against the oral tract, that is of a closure which takes place when sucking. With sucking the velum comes to stick to the back part of the tongue, and at the same time with strong sucking the pharyngeal muscles pressing the pharynx together are participating: this is why in the pharynx we get a feeling of narrowness, and this is the basis for the corresponding meaning of the phonemic characteristic SN. In this phonemic characteristic S is the successor to the dental click and has no auditory but merely a proprioceptive value, since with real sucking — in opposition to sipping — there is no fricative S noise to be heard. This is also the origin of S in the meaning »strike, smite« which appears in the same complex characteristic SN. The oral meaning of »taste« of the characteristic SN which gives significance in the concept group SMELL, TASTE, SUCK is — as it has been stressed under 34 — virtually identical with the meaning of »strike« and is based on the perception of a simultaneous movement of the tongue and of the velum downwards. And since, with feeding, tasting

is consistently bound up with smelling, the SN characteristic finally stands also for smelling, only that in this case the N element of the characteristic renders above all the passing of the inspired air through the nasal tract. An unimpeded inspiration of the air through the nose (36) is possibly also a tactile-proprioceptive basis for the meaning »smooth«, to be found under 15.77 smooth with the SN characteristic as well as with the mere N characteristic. Yet the latter meaning appearing in the radical morphemes *sem-, mēi-, nei-, yem-* more likely relies on the perception of a smooth passing of the food through the pharyngo-palatal arch (isthmus faucium) which was under 35 supposed as the imitative basis for the NN phonemic characteristic. The above radical morphemes, where the meaning »smooth« is given, may be added by other roots with the same characteristics: *smē-* in Icel. *smeikr* (P 966), *mel-, smel-* in OE *smolt*, Du. dial. *smout*, etc. (P 716—718, Fat 1084), and by unidentified roots in Icel. *snöggr*, Dan. dial. *snøg*, LG *snugger*, *snögger*, and also *snigge*, *snikker* (FaT 1103). Very close to the meaning of »smooth« is the meaning of »slide« (56), and in fact we find here again the SN characteristic; thus under 10.41 creep, crawl, there appear the roots *sneg-, meu-, smeu-*, and (s)nā-. All the enumerated meanings connected with the characteristic SN can in this way be derived from the tactile-proprioceptive perceptions either at sucking or at tasting and chewing and at the same time smelling.

58. With the meanings »smooth« and »slide« we have already come into the sphere of the concept group SMOOTH, SLIP, FLAT. Although the SN characteristic, dominating under SMELL, TASTE, SUCK, represents one of the possibilities of imitative representation of the concept mentioned, they are mostly expressed with SL, mere L, or L in some other combination. Instead of the dental and nasal characteristics for these meanings, characteristics which — as we have seen — correspond to the perceptions during the passing of chewed food through the oral tract and sometimes during the passing of the inspired air through the nose, we find here the lateral phonemic characteristic which corresponds to the passing of liquids. It follows from the significance of the L characteristic that such a tactile-proprioceptive image is particularly suitable for rendering the concepts »smooth« and »slide«, and after all that has been said so far, this morpho-semantic correlation does not require a special explanation. But there is another thing to be pointed out. The significance of L in the concept group SMOOTH, SLIP, FLAT does not rest merely on the recurrence of this characteristic with the meanings »smooth« and »slide« but also on its recurrence in the meaning »strike«. The mere L characteristic can already associate with the latter meaning, e. g., in the root *leu-2* under 9.27 split and under 8.35 treshing-floor, or in the root *leu-1* under 1.214 mud, where in all probability the basic image is that of splashing in the mud. The same applies to the phonemic characteristic SL occurring under 1.33 lake in the root *sel-o-*. In this root we find in Gr. *hélos*, the meaning »swamp«, which recurs in the root *leu-1* in Lith. *liūnas*; it is almost certain that »swamp« is the meaning more original than that of »lake«, and the phonemic characteristic L stems from the basic image of

man's splashing steps in the swamp. We must remember our general findings under 56: such imitative value of L and SL can be explained only from its provenience from a clicking sound prototype, this time from the lateral click. Just as with the characteristic SN attention has been called under 34 to the roots smēi-, (s)nadh-, sneit in the concept group SHARP, so we can now draw attention to the roots slak- and (s)leigh in the same concept group as well as to the root lei-, slei- in Ir. sligim, and to the unidentified root in Ir. slaidim under 9.21 strike in the concept group TOUCH. Also the Rum. lovi from the Old Slavic loviti under 9.21 points to the original meaning »strike« rather than to a later shift of meaning in Rumanian; the basic meaning of the corresponding root lāu- is, accordingly, probably »strike« beside »taste« which is rendered in Grk. apolaúo »I savour« and lārós »savoury«.

59. Beside the SL characteristic the concept groups SMELL and SMOOTH are connected also by the NL and TL characteristics. Just as we found SN, so we found also NL already under NARROW (34). There, for the first time, we established in the root mel- the meaning of »strike« which comes from the perception of the energetically lowered velum; in this meaning the root mel- is found also under 5.56 grind, 5.55 meal, and 5.57 mill in the same concept group. But it is found also in the meaning »press«, »press down« in the synonymic set 9.31 rub. Since this root appears in two forms — either without the shifting S or with it — it at the same time contains two characteristics SN and NL which in fact represent a unitary tripartite dental-nasal-lateral characteristic SNL. This is by its form identical with the characteristic SNL in the root smel- with the obvious basic meaning »smell« and since the same roots are used at the same time for tasting and smelling, as is shown for instance by the roots smeg(h)- and swek-, we are justified to consider the root mel- smel- »pound«, »grind down« as belonging together with the root smel- »smell«. That etymologists did not bring the two roots together was prevented already by the circumstance that they took as the basic meaning of the root smel- »to smell« the impersonal meaning of this root »burn slowly and with smoke, smoulder«. This corresponds to the general tendency in etymology founded on the belief about the prevailing role of visual images in the language. But the variant smer- beside smel- »smell« confirms our explanation, being opposed to the root mer-, smer- »rub« and »pound«, »grind down« (e.g., under 15.75 soft) in exactly the same way. The fact that the initial S can disappear may be explained as follows: the former dental click in the meaning of a strike was used optionally, since this meaning was already contained by the nasal and, with the tripartite characteristic SNL, also by the lateral click as the predecessor of L. In any case the NL characteristic is in correlation with the meaning of »strike« in both concept groups SMELL and SMOOTH. It refers to the meaning of a tasting strike with the tongue under 4.26 tongue in the root mel-, under 15.35 sweet, 5.84 honey, and 5.91 mead in the root mel-it, and in the sets 15.31 etc. »taste« in the root mels-. The same root mel- which serves to denote a strike with the tongue, may also be used to denote a strike with the flail under 8.35 threshing-floor. The

second part of the lateral click, i. e., the movement backwards, is to be seen in the meaning of the root *melg'*, *melk'* »slip off, wipe, milk« which appears under 5.86 milk (sb.). The enigmatic U in Goth. *miluks* etc. is understandable as an expressive transformation of the original root if we remember that the underlying image is the passing of milk through the oral tract and that the phoneme U stands in a correlation with the deglutition, as it follows from the roots (s)leug- and lauk-o-. Outside our statistical population we may draw attention to the radical morpheme *mel-3* »delay« (P 720). As »delay« very probably has its origin in the meaning »draw«, the proprioceptive image here exactly corresponds to the proprioceptive image in the verbal meaning »milk«.

60. The third characteristic which both concept groups SMELL and SMOOTH have in common is **TL**, which has already been analysed in detail under 49 and 50 on the basis of the root *dl*ku-*. Let us briefly survey the occurrences of this characteristic in the remaining roots from these two concept groups. In the meaning »flat« the characteristic **TL** occurs in the concept group SMOOTH in *tel-2* under 9.52 board, 7.44 table, 18.55 tablet, 7.26 floor, and 1.21 earth, land. It is the adjectival, qualitative meaning »flat« which is generally considered to be the basic meaning of this root; but the imitation pattern contained in the root is »to strike flat«, either with the tongue or with a flat-hand or flat-foot. The oral meaning of the root can be traced in Skt. *tālu-* »palate«, which points to the original articulation of the strike in the mouth with a click; the transfer to the hand or foot is evident from the Skt. *talam*, which at the same time denotes »palm« and »heel« in addition to the general idea of »flatness«. The verbal meaning of »strike« is probably preserved also in Skt. *tad**- under 9.21 strike for which even a Dravidian source has been postulated. A further confirmation of our interpretation represents the meaning »bear, bear up with« in the homonymous root *tel-1* (P 1060); this root has in fact the reversed passive meaning »be oppressed, weighed down« beside the active »press, put on«, which is well preserved for instance in Gr. *entéllein*, *epitéllein*, and *télos*. The meaning »press« is directly derived from the meaning »strike« (56). The **TL** characteristic is contained also in the root *del-3* »split, carve, cut into shape« which is found in the concept group SMOOTH, under 9.27 split, and again under 18.55 tablet, and 7.26 floor. That the basic image of the root *del-3* is merely a variant of the image contained in the root *tel-2* is, beside the meanings in Toch. B. *tsalt* »chew, masticate« and Lith. *delna*, ChSl. *dlanъ* »palm« (P 195—6), demonstrated above all by the semantic load of the homonymous roots. The root *del-1*, which appears in the REPRESENTATIVE SAMPLE in the synonymic set 18.21 speak, talk, conveys the meaning »talk«, i. e., »strike with the tongue« as the basic meaning — even if in Pokorny's Indo-European dictionary this meaning is given under the entry of this root at the end. This is convincingly supported by a whole series of parallel roots under 18.21 which just as well contained the **L** characteristic and have the same imitation pattern, e. g., *tolk-*, *lā-*, *plab-*, *blat-*, *bhel-*; and at the same time this elucidates the origin of the

verbs Boh. *mluviti* and Skt. *brū-* in the same meaning which are etymologically as yet not sufficiently explained: in fact we have to do with a U extension of the root *mel-1*, discussed under 59. Beside *del-1* which is based on the image of the movement downwards we get also *del-5* which is based on the image of the movement back, towards oneself. The meaning »long« of this root which is found under *SMELL* in the synonymic set 16.62 is derived from »drawn«, i. e., »elongated«, and the same image »draw« is the source of the parallel meaning »delay«, i. e., »prolong«, extend in duration«. In this connection we may draw the attention to the fact that the above mentioned root *tel-1*, besides its meaning »be weighed down« has also the meaning of »draw towards oneself« in Ir. *tlenaim* »I steal«, and the meaning »draw up«, opposed to »press down«, in Sanskrit and Latin, while Grk. *tantaleiō* from the same root expresses the notion of waving and swinging. Even two further homonymous roots outside our statistical population: *del-2* »totter, swing«, and *del-4* which conveys the meanings »shower, rain, moisty«, clearly belong to the morpho-semantic area of the table XV.

With the root *del-5* »draw« we pass on to the concept group *TOUCH*. Although the **TL** characteristic is not significant there, it is nevertheless a component part of the significant characteristic **T**. The root *del-5* is represented in the concept group *TOUCH* in the synonymic sets 12.57 long, 12.44 far, and 11.15 hold which is understood as the result of »drawing towards oneself«. But here we get also the imitation of the movement downwards in the root *telek-* under 9.21 strike; this root, moreover, contains the meaning »press«, and with a secondarily changed direction forward the meaning »push, shove« under 10.67. The meaning »strike« is conveyed further by the parallel root *teleg'h-* (P 1062) which at the same time means »babble«. Now, »babble« is a contemptuous parallel of the »decent« meaning »talk«: both meanings are found together, e. g., under the roots *lā-* (P 650) and *plab-* (P 831). On the other hand the root *plab-* again denotes »strike«, as shown by the English verb *flap* from the same root. And the parallel root *blat-* (P 102) connects the meanings »babble« and »splash«, i. e., »strike on water or some other liquid«. It follows clearly from all these parallels that the basic image in the roots *telek-* and *teleg'h-* is the image of a flapping tongue. It appears justified that these roots as well as the homeophonic root *telp-* with its basic image »to be compressed« (in the synonymic set 13.19 crowd under *NARROW*) are mere extensions of the roots *tel-2* and *tel-1*, or rather of a unitary fundamental root *tel-*.

61. By now we have exhausted the analysis of all the significant complex characteristics which in addition to possible nasals contain mere central oral consonants — with the exception of one: the phonemic characteristic **ST**. Let us add here that the semantic content of the characteristics with the reverse order, i. e., of **NS** beside **SN**, **LS** beside **SL**, **LN** beside **NL**, and **LT** beside **TL** is on the whole the same as with the opposed significant characteristics of a considerably higher frequency; this permits the conclusion that they have their origin in metatheses or at least have originated under

the influence of characteristics with higher frequency. With the phonemic characteristic **ST** the explanation is less simple indeed. Although our findings so far have convinced us about the very early origin of the direct phonemic combination **TS**, this combination does not occur in the normal Indo-European phonemic system, and also **TS** as a consonant pair with the intermediate vowel appears only once in our normal phonemic distribution and two or three times in Pokorný's dictionary. On the other hand as a consonant pair **ST** has a very high frequency: of the 63 instances in the REPRESENTATIVE SAMPLE there are 54 in which **S** is followed directly by **T**. If we start from the natural supposition that the phonemic combinations with a higher frequency are of an earlier origin, we would have — contrary to our findings so far — to conclude that the phonemic combination **ST** is older than the phonemic combination **TS**, particularly as a direct combination and subsequently also as a consonant pair with an intermediate vowel. But such a conclusion faces us with the unanswered question why, as a consonant pair with an intermediate vowel, **TS** did not develop — the ratio of 63 **ST** against 1 **TS** in our normal distribution being so unusual that it undoubtedly contains in itself a reason for it. As it is demonstrated by our statistically significant characteristics, the secondary — central or other — vocalisation of the original direct combination of consonants has to be taken as established, otherwise the imitative value of these combinations would be in most instances unintelligible. This has come to light when dealing with the phonemic combination **KN** under 33, and it agrees with the arguments of J. van Ginneken [55] and, more recently, of the Russian linguist V. V. Martynov [58], 17—18, arguments based on various facts and with reference to a whole series of languages*. If, accordingly, **TS** has not developed into a centrally vocalised consonant pair, this is best explained by assuming that as a normal phoneme **TS** must have disappeared already in the pre-Indo-European period before the vocalisation of the morphemes; its successors might be **S** or **T** in so far as they do not have a direct origin in clicks. But did the phonemic combination **ST** in fact originate from a secondary combination of **S** and **T** phonemes and secondarily achieve such a high frequency? This does not agree with the fact that a large majority of the consonant pairs **ST** is without an intermediate vowel and must therefore have come up before the central vocalisation. Under the existing circumstances the only acceptable explanation seems the following: **ST** developed from the extinguished **TS** not by means of a sound shift but through metathesis, like **NS** from **SN**, **LS** from **SL**, etc., or rather it developed, supported by the respiration, directly from the dental or a dental-like click, similarly to the development of **T** and **S** (53 and 56). The conclusion that, at least in some cases, the Indo-European **ST** developed through a metathesis from **TS**, was made, on the basis of a comparison of Indo-European and Siberian and other languages, also by V. M. Illič-Svityč and by A. B. Dolgopolskij [59]; their works, however, were unfortunately not accessible to us.

* The non-existence of vowel phonemes in pre-Indo-European has been asserted more over by C. Hj. Borgström in *Word* 10, 1954, 278, whose paper could not be consulted.

62. The most plausible explanation for the origin of the imitative Indo-European ST, which is significant in the concept group TOUCH, is again to be found through a comparative semantic analysis. As the starting point for a simultaneous explanation of the phonogenesis and the imitative value of this complex phonemic characteristic we must take the fact that in its semantic content ST considerably differs from the characteristics with the central oral consonants discussed so far. To facilitate the right understanding of what follows, a general description and classification of human movements is necessary, taking into account the parallelism between movements of the organs of speech, and movements of the body and its organs. The first criterion which has already been applied many times is **the criterion of direction**. All the movements, articulatory or non-articulatory, proceed, with regard to the human body, in one or more of the four directions: downwards, backwards, upwards, and forwards. In the articulation of sounds the first two directions are used by clicks; the latter two are used by respiratory sounds.

For another criterion, not discussed so far, it is best to refer to the classification of movements as it has been done for the most full utilization of energy and time in operating machines. According to that classification, the basic arm motions called either »reaches« or »moves« — depending upon whether the predominant purpose of the motion is to transfer the arm from one position to another (reach) or to move an object from one position to another (move) — are divided into three classes: A, B, and C. They are described as follows: »A class A motion is stopped by impact with a solid object. All muscular effort is used to move the arm in the direction of the motion. None is used to slow down or stop the action. A class B motion is stopped entirely by muscular control. No new contact is made in the stopping action. A class C motion is stopped by the use of muscular control to slow the motion before coming to a stop in a grasping or placing action.« Examples of A are: »making a downstroke in hammering«, »pushing a flat sheet of metal against a stop in metal shearing, keeping the hand on the sheet throughout the action«, and »clasping the hands together«. Examples of B are: »making the upstroke in hammering«, »opening a door or a drawer«, »using a rubber eraser in a back-and-forth motion«, and »tossing an object aside«. Examples of C are: »reaching to and grasping desk pad«, »carrying desk pad to desk and placing down«, and »reaching and placing hand on top of desk« [60], 35—50.

The above classification, as we can see, distinguishes in the first line between stopped movements which stop because of the impact on a solid object, and restrained movements which stop predominantly or merely because of the muscular control, i. e., A is opposed to B and C. **This criterion according to which stopped movements are distinguished from restrained ones** can be profitably applied for all movements including those in the articulation of sounds. The categories of stopped, unrestrained movements, and of restrained, unstopped movements must be complemented only by the unrestrained, unstopped movements for the classification to be complete. Such movements are for instance: »draw without muscular restraint«, or »slide (down)«.

If all this is applied to the articulation of sounds, the movements of a click downwards or the returning of the tongue after the completed articulation of T downwards is a stopped, unrestrained movement; the movement of a click backwards an unstopped, unrestrained movement; and the movement of the inspiratory or expiratory S against the alveoli or the hard palate an unstopped, restrained movement.

63. The semantic content of the phonemic characteristic ST permits the conclusion that, in contradistinction to the S and T characteristics discussed so far, we get in most cases a non-stopped, restrained movement. The root *stā-* which is in the concept group TOUCH the most frequent radical morpheme with the ST characteristic has as its basic meaning »set oneself on one's feet«, »take a stand«, and »set up«; and from the meaning »take a stand« comes the resultative meaning »stand«. Evidence of this exists in all Indo-European languages, e. g., in Gr. *histēmi* »I set up«, Lith. *stoju, stoti* »tread« and ChSl. *stati* »take a stand«, except in Sanskrit and in Germanic languages; in this case as in other instances the primary meaning in Sanskrit has not been preserved. Accordingly, *stā-* in the synonymic set 12.15 stand refers to the restrained movement of one's legs downwards when one takes a stand (D 2a. See Table XVI). In the sets 12.12 put, 12.11 place, and 9.44 build the root *stā-* refers to a parallel restrained movement of the arms downwards when one sets something up. The same meaning is conveyed in the sets 12.12 and 12.11 by the root *stel-3*; the meaning »set up« is generally recognized as the basic meaning of this root. The third root with the ST characteristic in the sets 12.12 and 12.11 is *sed-*; its basic meaning is »sit oneself«, i. e., a restrained movement of the whole body downwards. In fact, in all these cases we have to do with two opposite movements: with a basic movement which is directed downwards, and an opposing, restraining movement in the reverse upward direction. The restrained movement downwards, viewed as a whole, is a resultant of both (D 2a = D 1 + U 2b).

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- 1s. STOPPED MOVEMENTS
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OUT — FORWARDS

1. UNRESTRAINED UNSTOPPED MOVEMENTS
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- 2a. RESTRAINED MOVEMENTS
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1. unrestrained unstopped movements (no)
- 1s. STOPPED MOVEMENTS
3. MOMENTARY PRESSING FORCE
- 2a. restrained movements (arms, legs, body)
- 2b. restraining movements (tongue)

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The question that still remains is how the transition from clicks to the respiratory articulation, required by the imitations with the ST characteristic, took place and what is the role of the sound S. It seems that S here arose from a guttural inspiratory fricative which merged with an ingressively but non-respiratorily articulated click. This inspiratory S could essentially contribute to the origin of T which, likewise, here has to be supposed as an inspiratory sound. The circumstances leading to such a supposition are as follows:

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1) S as the only consonant of a Indo-European radical morpheme — and particularly if in such a case it occurs in the initial position — expresses mostly movements which are with regard to the human body directed inwards or backwards: it substituted the inwardly directed articulatory component of the click and its semantic function. But the articulation of the tongue is in the production of S directed forwards and upwards and the lower jaw as well is slightly protruded. It is highly probable that there exists even a connection between the sibilants and the antropological development of chin, since with the more primitive races with pronounced prognathism sibilants are missing [43], 452 ff. Moreover, in opposition to the sucking movement of the click, with the initially closed mouth, the labial opening is enlarged from the very beginning in the production of S [15], 418—419. The semantic identification of so different articulatory movements with the click and with S thus most naturally must have begun with the identification of the proprioceptive perception of the inwardly directed click movement and of the tactile perception of the inwardly directed air stream (56). And whereas the inspiration supported by the inwardly directed articulatory component of the click gave S, the inspiration supported by both articulatory components of the click, inwards and downwards, gave an inspirated TS or ST. The semantic content of TS remained the same as that of the click, because the sequence of the proprioceptive and tactile perceptions — first of the movement upwards-downwards and then the streaming of the air inwards — remained strongly similar to the sequence of the perceptions with the click. And the reversed sequence of these perceptions with ST — first the streaming of the air inwards and then the movement upwards-downwards — gave ST a wholly new semantic content of a movement forwards and upwards. The exact performance of a restrained movement was attained by degrees only. In the first stage of the articulatory transformation S and T must have been two unrestrained movements of the tongue, sucked in by the stream of air inwards and upwards, stopped by the impact with the alveoli and the hard palate (Ols, Uls + I1).

2) It is surprising that in a whole series of synonymic sets along with the morphemes containing ST, there occur radical morphemes with an initial guttural characteristic and the meaning »seize, grasp« which are clearly of inspiratory origin. These are especially the roots kap- and ghabh- which occur beside stā- and stel-3 under 11.16 get, obtain. The same inspiratory origin has to be assumed for the root ghed-, ghen-d- which gave the English synonym in this series: get [61], 14. The root ghed- is again found in the sets 11.56 steal and 11.57 thief, beside ster- and (s)tāi-, and kap- and ghabh- are found beside sed- and (s)teu- in the set 9.943 fitting. The concept group TOUCH has in its phonemic distribution a numerical superiority of both characteristics KT and KP and the numerical superiority of these two characteristics taken together gives a significance such as is given within the frame of the general T characteristic by the joined consonant pairs KT + TK. Therefore we are justified to postulate an inspiratory origin also for the radical morpheme kḥē(i)- which is parallel to the roots kap-, ghabh-, ghed- under 11.16

get and for the radical morpheme ghedh-, which is parallel to the roots kap-, ghabh- under 9.943 fitting. The semantic range of the root ghedh- is characterized by the meanings »get at, acquire, find« in Lett. gadit (Vas. 1.283—4) which is missing in Buck's and Pokorny's dictionaries. The motion image underlying all these imitations with an initial fricative guttural and a final stop is that of the inspired air stream and of the closing movement of lips or tongue. The derivation of the roots kap- and ghabh- from a snapping sound (»Schnapplaut«, P 528) shows that the restrained closure of lips or tongue here also developed from an initially unrestrained stopped movement (O 1s, U 1s + I 1) and that the original motion is the same as established for the initial stage of the articulatory development of the characteristic ST.

The parallelism between KP, KT on the one hand and ST on the other hand is to be seen particularly clear in the synonymic set 16.62 desire under SMELL, where with most of the radical morphemes the basic meaning is that of an excited, violent breathing in. There we find many radical morphemes with an initial K: g'her-, g'wel-, ghreib-, gheldh-, g'wedh-, gheidh-, and keuəp-, the last three possessing a KT or KP characteristic. A numerous series of other roots belonging here, with the same K characteristic, could be added, e.g.: gheig'h- (P 427), ghōlo- (P 452), and particularly g'hē[i]- (P 419 in Grk. chatéō) and g'han- (P 411 in ON gana); for these two the imitation of breathing sounds is generally acknowledged. While the unextended roots with a final vowel or resonant sound seem to exhibit mostly an iterative or durative meaning, with the roots or extended roots ending in a stop the instantaneous meaning of a sudden, strong breathing in is often to be found. The same basic meaning appears in the parallel roots with the ST characteristic. A particularly striking example is given by the root sweid- which only because of the indefinite position of W has been let apart in our statistic calculation. This root appears in Lat. dēsiderāre, and the meaning »desire« — as well as the meaning »observe« in another compound: cōsiderāre — is on the basis of an artificial Classical etymology generally derived from sidus »star, sun, month« etc.; it is supposed that the original meanings were »desire from the stars« respectively »observe the stars«. In fact all these meanings originate from the image of a sudden, strong breathing in, the opening of the mouth being synergetically produced together with the winking of the eyes at a sudden appearing of light. The basic meaning of »breathing in« is directly evident in the root swei- found in Bret. c'houesa under 15.21 smell. The ST characteristic here does not reflect only the stopped unrestrained movement of the tongue (O 1s, U 1s) but also the stopped unrestrained movements of ribs and chest upwards and of the trunk muscles backwards (U 1s, I 1s) produced by the violent breathing in. In other words: the ST characteristic reflects simultaneously the violent inspiration and the stopped breath.

Among the roots with the K characteristic under 16.62 the closest agreement with the root sweid- is shown by the root keuəp-. Reviewing its various meanings we come, e.g., across the meaning »dismay, disconcert« in Boh.

prekvapiti (missing in Pokorny and Berneker*); we know this meaning from Lat. consternāre in the previous paragraph. And a direct — not causative — meaning based on an identical motion image is found in Norw. kveppe (from hveppe) »start back, recoil with fear« (FaT 604). Now we can see that with consternāre, stupēre, styltan etc. we are concerned with stopped breath and only in this connection with the restraining of the whole body (I2b). The recognized identity of the basic image of violent inspiration and stopped breath when starting with surprise or starting with fear, just as well as the recognized connection between a sudden, strong breathing in, a winking and the sudden appearing of light, permits us to understand the systematic appearing of these meanings with the characteristics ST and K, and in the latter case, especially with K and stops. So we get under the root (s)ter-1 — besides consternāre — the meaning »desire« in Grk. strēnos »intensive desire, etc.« (P 1022), and under the root ster-2 exactly agreeing with consternāre Goth. stairno »star« (P 1028). The old dispute — whether, besides the root form ster- in the name of stars, a parallel root form stel- has to be assumed [11]; [62], 101 — can be settled remembering that besides consternāre with ster- we have also OE styltan with stel-.

A doublet of Norw. kveppe is kvekke, having the same meaning. Unlike kveppe which remained up till now etymologically unclear, kvekke has been long ago brought in connection with the root kwek'-, kweg'- (P 638, FaT 604, Bern. 1.153—4, 497—8). Once more we find under this root, besides the meaning »start back, recoil with fear« in kvekke, the meaning »get a desire or a demand for something« in SCr. čezni. But all the more striking is the simultaneous presence in this root of the meanings »shine«, »appear« in Skt. kāsātē, of the meaning »look« in Skt. cakāsyatē and Av. akasat, and of the meanings »brightness, face, eye« in Av. caks*u. The presumed disagreement of these meanings, found in the ancient languages, with the Germanic and Slavic meanings pointing to the image of a sudden, strong breathing-in caused that the Germanic and Slavic terms are missing in WP and Pokorny. Nevertheless, if we consider the parallels under the roots sweid- and ster-, all these meanings belong clearly together. In Slovenian we get an example of their genuine connection in two regular forms of the same verbal root. The imperfective verb hlepeti, considered an onomatopoeia, means »desire violently, demand violently« whereas the perfective form of this verb, i. e., hleniti means »flash«, »make a sudden appearance« when speaking of light (Plet. 1.272).

The network connecting morpho-semantically related synonymic sets with parallel denotative chains (23) extends here still further. Besides the SCr. čezni »get a desire or a demand for something« we find ChSl. čezni with the meanings »vanish, pass away, disappear«, and its compound ištezni combines the meaning »disappear« with the meaning »shudder«, basically

* If even this verb might be modelled on NHG überraschen (B 16.16), its derivation from the verb kvapiti »hurry« with a primary KP characteristic, quoted below, shows clearly the persistent force of the basic image of stopped breath and the regularity of semantic transitions within the same denotative chain.

the same as in Norw. kvekke. Now, in the Faeroeran hvökka which is related to Norw. kvekke there is besides the meaning »start back, recoil with fear« a surprising recurring of the meaning »disappear« found in ChSl. čeznati, išteznati. The explanation of this semantic development under the root kwek-, kweg-, is given by the examples under the parallel root keuðp-. Thus the Serbo-Croatian verb kopnjeti at the same time means »desire violently« and »swoon«, »disappear«, »melt« when speaking of snow (Bern. 1.566). And Norw. kveppe »start back, recoil with fear« is closely related with Goth. afhvapjan »suffocate, extinguish« and afhvapnan »be extinguished« (P 596). Here the basic image by which the meaning »disappear« is brought about is clearly indicated: it is the image of missing air, of stopped breath underlying also the meanings of »desire« and »recoil with fear«. On the basis of these parallels we are justified to conclude that another root with the characteristic **K** + stop, the root g^{wh}dei(ð)- under 5.15 thirst in the concept group SMELL, having the meaning »disappear, perish« besides »destroy«, is just an extension of the root g^{wh}edh- »beg, desire« appearing under 16.62. The same supposition has to be made for the root g^{wh}der- combining the meanings »run, flow« with »flow away, disappear«. The semantic analysis at least for this instance decides a disputed question of Indo-European phonetics: **d** has its origin in the earlier **dh**, and **s** in these places in Sanskrit is secondary. The exact correspondence to g^{wh}der- »flow away, disappear« with the **KT** characteristic is given by (s)ter-1 with the **ST** characteristic in Alb. shterr »drain, dry up« in the reversed active sense (P 1022).

To complete the description of the morpho-semantic area treated let us quote a few additional examples with the **ST** characteristic, belonging here. The image of being short of breath (**U**1s, **I**1s) is contained also in the meanings of »panting, snorting« and of »zealous, panting endeavour« which are represented under the root keuðp-, e.g., in Boh. kvapiti »hurry« and in kyprý »zealous, busy«, secondarily »fresh«. These have a striking parallel in Lat. strēnuus »strenuous, ardently persistent« under (s)ter-1 (P 1022) and in Lat. studēre »seriously exert oneself for something« under (s)teu-1 (P 1033). And Norw. kveppe, kvekke »start back, recoil with fear« are corresponded to by ChSl. strach »fear« under (s)ter-1 (P 1023) and by Grk. stugéō »I hate, I fear« under (s)teu-1 or steuð- (P 1032, 1035). The meaning »hate« is derived from the meaning »detest, abhorrr«, which is in turn derived from the basic image of »shudder«, i. e., from a convulsive taking-in of the breath and from a reflex rebounding when coming in touch with something abhorring, detestable (**I**2b).

65. The comparison of the **ST** characteristic with the **KT**, **KP**, and **KK** characteristics gave us the opportunity of a better insight into the various imitations of the restrained and restraining movements, decisive for the significance of these characteristics. At the same time this comparison indicated their connections with the previously not discussed imitations of the stopped inspiratory movements. To facilitate orientation in the otherwise almost unsurveyable material we have prepared a special table (Table XVI) about

the parallel and other movements in which the criterion of being stopped or unstopped, restrained or unrestrained, as well as the criterion of direction have been taken into account. This Table, to which references were made in the preceding paragraph already takes into account all the imitations for which primary clicking articulation is assumed, all the imitations which are likely to be based on an originally inspiratory imitation, and also the imitations which can be explained from the normal expiratory articulation which for the central oral consonant genetically doubtlessly comes last.

Not only the **ST** characteristic but also **T** characteristics in general occur in all three articulatory and morpho-semantic areas, and hence it is appropriate to conclude our explanation of the central oral consonants with a complementary survey of the **T** characteristics. In the synonymic sets 12.11 put and 12.12 place we find, beside the roots *stā-* and *sed-*, the roots *dhē-2* and *dō-* which have the same imitation pattern as the first two (**D 2a**), although they do not contain the introductory **S**. The meaning »reach out« in the forward direction (**O 2a**) appears in the pronominal roots *to-* under 12.44 far and *de-* under 9.943 fitting, as well as in the root *ad-2*, which is identical with the prepositional root *ad-1* in the meaning »at, to«. On the other hand, the roots *tā-* and *dē-* in the concept group **NARROW** apparently come from a clicking articulation, the first relying on the basic image **D 3**, i. e., of the pressing force downwards, and the second on the basic image of **I 3**, i. e., of the pressing force inwards. If we revert to the concept group **TOUCH** we find there the root (s)*teu-1* under 10.67 push, shove in a meaning completely opposite to the one so far encountered in Lat. *stupēre*, etc. and in Lat. *studēre*, etc. The meaning »push, thrust« (**O 1s**) is traditionally taken as the basic meaning of this root; but if the explanation for *stupēre*, etc. »be astonished« from »to be struck« is possible through an isolated analysis of the root for itself it is wholly impossible to develop »studēre« from »aim at something«, supposed to be arisen from »strike at something«. It is improbable that one single parallel for such a development could be found. In fact, the root (s)*teu-1* reveals a transition from the inspiratory meaning »a stopped, inwards directed breath« to the expiratory meaning »unstopped, outwards directed breath, or puff« (from **U 1s**, **I 1s** to **O 1**). Such a meaning of this root is proved — beside the OE *stenc* in 15.24 smell under **BLOW** — by the OE *steam* »steam«, Goth. *stubbj* »dust«, OHG. *stioaban* »fly about, sprinkle, scatter«, etc. (FaT 1201, 1558) which are not included in Pokorný's dictionary. Along with the meaning »blow« there developed the meaning »thrust« (**O 1s** beside **O 1**). For such a semantic development there are many parallels, thus e. g., *b(h)eu-2* »blow (up)« (P 98) has a homonym *b(h)eu-1* with the meanings »impressions of hollow sounds« and »thrust«. But the same semantic relations are found in the rhymed roots containing the same dental characteristic: *dheu-*. The root *dheu-4* which appears under 15.24 smell in Goth. *dauns* and which is designated as having the basic meanings »fly about, sprinkle, whirl esp. of dust, smoke, steam«, »blow«, etc. has also decidedly inspiratory meanings, e. g., Lith *duse*ti* »draw breath with difficulty, sigh, pant, gasp«, and *dusti* »get out of breath« (P 270). And under *dheubh-*

(P 268) we suddenly find East Fris. *dufen*, *duven*, *dubben* »thrust«, although the basic meaning is designated in different terms. Moreover, in the root *dheu-2* (P 260) we come across the image of stopped breath (U1s, I1s) in the meanings »swoon, die, become extinguished« on the one side, and in the meaning »admire«, i. e., »be astonished, be surprized« on the other, meanings all familiar from our discussion of the ST characteristic. In the root *dheu-3* (P 261) there occurs even the meaning »shine«. With a different U diphthong we get further in the root *dhau-* in the set 9.342 under NARROW the meaning »strangle, suffocate« (U1s), precisely the same as in Goth. *afhvapjan* »suffocate, extinguish« under the root *keuðp-*. A homonymous, but lengthened, root is *dhāu-* (P 243), denoting once more »be astonished, be surprized«, and »observe« (U1s, I1s gives I2b); and beside it we find again under the root form with the I diphthong *dheið-* the meaning »see, look«. The semantic range here considerably overlaps with that of the root *kwek'-*, *kweg'-*. These formal and semantic relations being found in the radical morphemes with a mere T characteristic so surprisingly repeat those appearing in the roots with a ST, KT etc. characteristic that it is difficult to doubt about their parallel inspiratory origin and their parallel semantic development.

Just the meaning »be suffocated« and its causative-transitive counterpart »suffocate« can serve in the explanation of the mutual connection between the motion images, marked in Table XVI with 3. STEADY PRESSING FORCE. We find this meaning, besides in the already mentioned *dhau-*, with a ST characteristic in the root *stēib(h)-* (P 1016) in NE *stifle*, in the root (s) *teig-* (P 1016) in OHG *irsticken*, NHG *ersticken*, and in the root (s) *ter-1* (P 1025) in the transferred meaning »die« in OHG »sterben«, Ir. *ussarb* »death«. This last transition of meaning was found already with *dheu-2*, and occurs also under *dheu-4* in Grk. *thánatos* »death« (P 266). Now, the meaning »suffocate« reappears with a T or TN characteristic in the root *dhem-*, which comes up in the set 10.38 *blow* under BLOW and in the set 15.34 *taste* under SMELL. The meaning »taste« points to a former clicking articulation (D-3), but the meaning »blow«, is, on the contrary, a typical expiratory meaning (O1). The intermediate stage with the image of stopped breath is represented by OHG *dempfen*, *tempfen* »suffocate, damp«, for which we get probably because of the etymological connection with *dampf* »steam« in Pokorny the sophisticated meaning »to suffocate with steam«. But the morpho-semantic area of the root *dhem-* is not exhausted with this. Here belong also ON *dammr* »dam«, Sw. *damm* »dam, pond«, Dan. *dam* »pond«, and Goth. *faurdammjan* »dam up, hinder«, which cannot be reliably classified anywhere else (FaT 135, P 239). The meaning »pond« well agrees with the ON *dy* »mud, mire, morass« and other meanings referring to moisture under *dhem-*, thus confirming the origin of the root from the oral images of tasting (56). The meaning »dam«, however, is connected with the image of a stopped breath. But how? We must remember our analysis of the KN, PN and TN imitations under 33. As a basic perception, common to all these imitations we established the perception of constriction and tightness in the pharynx when the body is exerting strong physical effort and the breath is at the same time being

stopped. With the characteristic TN we additionally established the perception of a stretched, tensed tongue. These perceptions represent the basic imitation pattern also for the meanings »dam, dam up« and »hinder« in the root dhem-. The distinction from the meaning of tasting in ON dāmr under 15.34 lies in the fact that ON dāmr contains beside the clicking articulatory image also the image of a lowered velum with a closure against the oral tract while in ON dammr »dam« we get the image of a raised velum with a closure against the nasal tract in connection with the image of a stopped expiration. In the clicking articulation of TN the tongue goes from the alveoli down and backwards, while in the stopped expiratory articulation of TN it resists with all force against the alveoli. Hence the meaning »dam (up)« and »hinder«. The image of a stopped expiration (I3 towards nasal tract, and O3 towards the oral opening) accordingly differs in its origin from the image of a stopped inspiration (U1s, I1s), which we discussed so far, although in its final effect the two coincide. Because of the final effect the two images intermix, so much so that the OHG dempfen »suffocate« might after all be classified under U1s, I1s just as well as under I3, O3. The classification under U1s, I1s clearly comes into consideration only where we do not find the meanings »dam (up)«, »hinder«, and the like.

It is significant that such meanings frequently come up also with the roots containing a ST characteristic but no nasal element. Thus we get under stā- OE stōwian »keep back«, MLG stuwen, NHG stauen »dam (up)« (P 1008), under the extended root stāk-, stek- Skt. stakati »withstands« (P 1011), and under the above quoted steib(h)- and (s)teigh- Arm. stipem »I press, I compel« and OHG stecken »stick fast«. Further we find under the root steb(h)- Skt. stabhnāti »he checks, hampers«, and with the reversed order of the operating forces also »he supports« (P 1012). With the root (s)ter-1 there comes up beside the meaning »shy« in Lat. sternāx suddenly a contrary meaning »stubborn«, present in Norw. sterre »resist, struggle against«; in this last word we find also the parallel meaning »make efforts, exert oneself«. Although in these cases we are in all probability concerned with a stopped expiration (I3, O3), it is nevertheless not possible to determine in all the cases whether the initial image is one of taking breath in or giving breath out; clearly, we here assist to a process of inspiratory images passing into expiratory ones. In the root stāk-, stek- we find for instance — beside the meaning »withstand« in Skt. stakati and the meaning »rope, cable« (i. e., »what is strung stiff«) in OE staeg — a markedly inspiratory meaning in Dan. staak-andet »short of breath«, ON stakkadr »short«, and in Lith. stokti »to start to lack«, stoka »shortage«. These last meanings have a parallel under deu-3 (P 219) in Gr. déō, déomai »I miss, am short of«, and since déomai means also »I beg, I desire«, the basic inspiratory image (U1s, I1s) is obvious; it is also confirmed with the apparently contrary meaning in MHG zouwe »haste«, zouwen »hurry« (i. e., »pant«) as well as by the meaning »fear« in the probable extension of the same root: dwei- (P 227). The meaning »slow« in Ir. doe, the meaning »far« in Skt. dūram under 12.44, and the additional meaning »succeed« (i. e., »glide smoothly off one's hands«) in MHG zouwen

point even to the morpho-semantic area of the clicking articulation; Skt. *dūram* is under 12.44 a synonym for the Lat. *longē*, derived from the root *del-5* with the basic meaning »draw«. But also with *deu-3* the expiratory meaning is already appearing, e.g., in Ved. *duvas-* »advancing, pressing forward«, which gives evidence of an extraverted motion image.

66. The decision whether in a given instance we have to do with an image of a stopped breathing-in or breathing-out is easiest with the radical morphemes containing at the same time a **T** and an **N** characteristic, such as *dhem-*. A parallel to *dhem-* is the root stem- (P 1021), where the nasal is the third morphemic element. Beside the meaning »check, hamper« (I3, O3) we have here the meanings »stutter, stumble, thrust« (O1s) and »shove« (O2a). But the closest parallel to *dhem-* is the root *tem-2* (P 1063) where only the initial dental is varied. Skt. *tamyati* »he swoons, faints«, *tamati* »he is suffocated« are an image of stopped expiration transferred into the inspiratory image of unsuccessful breath-drawing; the prevented respiration is causatively expressed in *tamayati* »he suffocates« (I3, O3 gives U1s, I1s). The meaning »fainting-fit, swoon« reappears in Ir. *tām*, which at the same time denotes »death«. That we really have to do with a stopped breathing-out is best demonstrated by the meanings »torment, oppress« in Russ.-ChSl. *tomiti*, which are typical of the **TN** characteristic with the basic image of constriction and tightness in the pharynx. The parallelism with the radical morpheme *dhem-* goes still further. Various extensions belong to *tem-2*: *temes-*, *temō-*, etc. appearing in Skt. *tamas-* »darkness«, *tamsra-* »dark«, and in related words of the same meaning in most of the Indo-European languages. The meaning »darkness« is clearly built upon the meaning »fainting-fit, swoon« and represents only a further semantic development of the stopped breathing-out. This development is exactly repeated also with *dhem-*, where we find Gr. *themērōpis* »serious, looking gloomily«, OHG *timber* »dark, obscure, black«, ON *dimmr* »dark«, Ir. *dem* »black, dark«, Norw. *daam* »dark«, ON *døkk*, and OHG *tunkal* »dark«, etc. The derivation of this meaning from »being gray as mist, as smoke«, given by Pokorný, would be possible in itself but is not probable in view of the astonishing parallel under *tem-2* and other morpho-semantic relatedness. A further relatedness of this kind is found as soon as we look at the homonym *tem-1*, found under 9.22 cut in the concept group SHARP. This root has not only the later specialised meanings »cut« and »hack, chop«, but also an earlier, undifferentiated meaning »strike« as evident from the ORuss. *tjati* (P 1063); and besides it also conveys the oral meaning »nibble« in Gr. *ténthēs* and *téndō*, *ténthō*. These are typical meanings of the clicking morpho-semantic area (D1s). *Téndō* and *ténthēs* are parallel to ON *dāmr* »taste« under 15.34 taste, and to NE tongue under 4.26; we should not forget also Bret. *tan'va* under 15.31 taste which goes back probably to the form *tem-* and not *ten-* (P 223). The meaning »strike« appears in the root *dhen-3* (P 249), merely with a varied final nasal, and here belongs among others also Ne dump »dull blow, thud«.

In opposition to these meanings of the clicking morpho-semantic area, the root *ten-1* which contains the **TN** characteristic and which is conspicuously represented in the concept group **TOUCH**, contains again the basic image of a stopped expiration with the nasal closure and the tongue strongly pushed against the alveoli (**I3, O3**). By means of synergism the image of the tongue resisting against the alveoli leads to the image of »draw with one's hands, feet, etc. planted against something«, i. e., a new imitation basis for a general, non-differentiated meaning »draw«, while the stress on the perception of the nasal closure and the constriction in the pharynx leads to the meaning »exert, strain oneself«. The transitive meaning »strain, tense« which occurs in the root may be a causatively reversed »strain oneself« but it may also be derived from the meaning »draw«, since, where we are not concerned with the straining of the muscles but with the straining of external objects, e. g., a rope, thread, etc., this may be achieved mostly by drawing. The only other possibility for straining is the utilization of the gravity for this purpose, namely to suspend a heavy object so that it becomes tense. The meaning »extend« also is derived from the meaning »draw« just as this was established for the meaning »long« (60). If in the traditional treatment of of the root the meaning »extend« is given in the first place, before »draw« and »strain«, this is probably because in the Sanskrit meanings of the non-extended root *ten-1* »extend« stands in the first place. Yet — even if we were not to accept the morpho-semantic explanation of the origin of the radical morphemes from the imitation of movements in the mouth — a mere logical analysis of the meanings should have priority before the supposition that it is just from the Sanskrit meanings of the primary root and their sequence that we may determine the basic meaning of a root. In this case we happen to come across the meaning »draw« with the non-extended root form in the Albanian verb *ndënj* and in the Greek noun *tétanos*, while in Sanskrit we find it with the extended root form *tens-* (P 1068). But the meaning »draw« occurs further with the root form *tengh-* in Av. *thang-*, directly and in the meaning »to bend the bow« (P 1067). Finally, also Lat. *tenēre*, found under 11.15 hold in the concept group **TOUCH**, means only »draw towards oneself«, showing an identical semantic development as occurring in the root *del-5* in the same synonymic set (60). Near by, under 9.33 draw the root *ten-1* is represented by W. *tynnu*, which is formally borrowed from the Lat. *tendere* »strain, extend, stretch«, but no less interesting because of that. For, restored in it as well as in Ir. *tennaim* »I press, tighten« (LP 61), are the primary meanings of the root which are not contained in Lat. *tendo* or at least not contained so clearly. The meaning »draw towards oneself« of the root *ten-1* is found also under 11.16 get, obtain. Beside the roots *stā-*, *stel-*, *ghed-*, *khtē(i)-*, *ghabh-*, *kap-*, and the reverse *pa*k'*, *pa*g'*, from the inspiratory morpho-semantic area (**O2a**), and beside the roots *dheugh-* and *leuk-*, *leuk'* which probably come from the clicking morpho-semantic area (**I1**), we get here in the root *ten-1* an expiratorily motivated motion image for this meaning (**I3, O3**). Only under 9.32 stretch the root *ten-1* appears in a derived meaning »extend oneself« and is — in opposition to its basic

image of resisting against something, of drawing, and of being strained — matched with the image of restrained movement (**O 2a**), there represented in the root *stā*.

67. We must omit a closer explanation of the morpho-semantic connection between the root *ten-1* and the root *(s)ten-1* found e.g., under **NARROW** in the set 16.39 groan; and the same applies to the further connection with the root *sten-2* found in 12.62 narrow. We only want to stress that the basic idea of pressing, which is only a doublet of tenseness (34), is present in both synonymic sets. As regards the root *dem-* represented under **TOUCH** in four synonymic sets, attention may be called to the fact that among the Celtic meanings of this root we find »suffer, endure, bear« (P 200), which point to a probable basic meaning of the root »press down«. This meaning might have originated either from the clicking articulation (**D 3**), as with *dhem-*, *dhen-3* in the previous paragraph and as this is probable also for the meaning »thunder« under *(s)ten-1*; or from an expiratory, pressing articulation (**I 3**, **O 3**) with a changed direction downwards. But we must above all try an explanation of the so far not yet discussed meanings of various homonymous roots *ster-*. We have dealt with *ster-* mostly as a restrained or restraining movement based on the inspiratory articulation (**O 2a**, or **I 2b**), and as a restrained movement *ster-*, classified as *(s)ter-1*, occurs also under 9.32 stretch. Beside this, under 65 we have, in connection with Lat. *sternāx*, established for *ster-1* another motion image: the image of pressing or resisting against something, which we explained as coming from a stopped expiration (**I 3**, **O 3**). This motion image led to the meaning »draw with one's feet, etc. planted against something«, discussed above under *ten-1*, and so we find *(s)ter-1* parallel with the latter under 9.33 draw. With the same meaning *(s)ter-1* recurs under 12.62 narrow. But *(s)ter-1* appears also in the set 10.23 fall; perhaps the meaning of »resisting or pressing against something« has passed into the meaning of »impact«, as for instance the root *stem-* in the previous paragraph (**I 3**, **O 3** passes into **O 1s**). Actually, under the root *(s)ter-1* we find along with the meaning »fall« also the meaning »stumble«, which we met with the root *stem-* (OE *steartlian*, P 1023). In the meaning »fall« only the direction of the impact seems to have changed: it is produced in the downward (**D 1s**) instead in the forward direction.

The radical morpheme *(s)ter-1*, the various motivations of which we have seen, is traditionally designated with the basic meaning »rigid, stiff«; from this meaning all the meanings of human movements in this root should be secondarily derived. In such an explanation, of course, all the connections with the homonymous roots *ster-2* and *ster-3* are broken off, and so they are with all the enumerated parallels from the inspiratory morpho-semantic area. But the question is whether it is possible without difficulty to derive from the meaning »rigid, stiff« the meanings which we have here come across, or is it not much easier to do the contrary. The meaning »rigid, stiff« and its further applications can be genuinely explained from a convulsive, shaking inspiration when feeling either fear, disgust or cold (**I 2b**), whereas as a starting point »stiff, rigid« leads to artificial reconstructions. Thus, for

instance, the supposition about the basic image of a stiffly strung rope to explain the meanings of (s)ter-1 in 9.33 draw and 12.62 narrow (WP 2.650) seems to be sophisticated and appears less genuine than our supposition about a stopped expiration with drawing or exerting oneself which is perfectly fitting into the logical structure of our general explication of the Indo-European imitative system.

In the concept group TOUCH, there occur, however, two other homonymous radical morphemes ster-. Ster-5 is found under 9.34 spread out, strew, 12.61 wide, broad, 9.44 build, and 10.67 push, shove; and ster-4 under 9.21 strike. The meaning »push, thrust« (O 1s) was met already with the roots (s)teu-1 (65) and stem- (66). There we established that it had developed either parallelly with an image of a strong puff (O 1) as the image of the impact of a puff against an external object, or from the image of a strong pressing of the tongue against the alveoli and a simultaneous pressing of expiratory air — this image having been equalized with the image of a puff pushed again an external object (I 3, O 3 gives O 1s). We may add that under (s)teu-1 we find also the meanings »stutter« and »stumble«; the images of thrusting at with the tongue, with the fist, with the foot are overlapping. Remembering OE steartlian »stumble«, the appearing of ster-5 under 10.67 causes no surprise. Slightly different is the case of »strike«. In contradistinction with »thrust« which is a forward directed movement, »strike« is, according to the extra-linguistic motion analysis and all the linguistic examples met so far, in first line a downwards directed movement. We are not justified to assume from the outset that with ster-4 under 9.21 represented by the English verb strike we have to do with a secondarily changed direction of movement, especially as the parallel case of (s)ter-1 meaning »fall« rather suggests that here possibly exists a primary motion image independent from the motion image of thrusting. The correct explanation of the meaning »strike« may be arrived at with the help of the meaning »scrape, graze, touch repeatedly carrying the hand over a surface« which is one of the basic meanings under ster-4 (P 1028). This is a type of the movement not yet known from the discussion of the ST characteristic. Normally we have to consider it as a combined, double movement, first in the direction back to oneself and then in the direction from oneself forth, in accordance with the English term »back-and-forth«. If, however, the movement is a single one, it is with reference to the construction of the human body to be expected, that we get a single movement backwards. The movement backwards is well known to us from the morpho-semantic area for which we assumed an originally clicking articulation (56). Yet there we had a smoothly running, unrestrained movement (I 1), whereas here the ST characteristic points to a restrained movement (I 2a) or rather to a twice restrained movement (I 2a — O 2a). The imitation pattern of »scraping, grazing, etc.« resembles to the imitation pattern of a restraining movement which we know from such meanings as »stand still, start back with surprise or fear« (I 2b); instead of a mere restraining movement we have here a fully completed movement in the direction backwards (I 2a).

If now we revert to the meaning »strike« under *ster-4* and compare it with the same meaning met in the clicking morpho-semantic area based on the image of an unrestrained movement downwards and backwards, the difference here lies in the analogy with the motion pattern of »scraping, grazing, etc.« In this case, however, we are not concerned with a restrained movement (*I 2a*), but with a stopped movement (*D 1s*, *I 1s*). According to its component of a stopped movement downwards (*D 1s*) this movement is identical with clicking articulation, but it differs from it through its component of a stopped movement backwards (*I 1s*) because the clicking articulation is unstopped in the backward direction. Just this stopping in both directions is rendered by the **ST** characteristic; we have to do with »rough« strokes as opposed to »smooth« strokes in the case of clicking articulation. Obviously, a role in the basic movement image is played also by **R** as the third morphemic element. This can be seen from the fact that with *stel-* we find a meaning different from the one with *ster-*. Under *stel-2* — which Pokorný erroneously equalizes with *stel-3* — we find only the image of a flat, smooth stroke downwards, the same as established under *tel-2* (60). A direct phonemic combination **STL** distinctly revealing its origin from a clicking articulation is found for instance in Lat. *stlatta* »a kind of ship, broader rather than high and so called because of its broadness«, in *lātus* from *stlātos* »broad« and in the certainly here belonging *stloppus* »the noise to be heard when a cheek is smacked« and »a vessel with a round neck«, i. e., a gurgling one [62], 206. The image of a »rubbed«, rough stroke is missing, just as under *ster-* the image of a flat, smooth stroke. Under *ster-4*, namely, we find beside the meanings »strike« also the meaning »rub«, e. g., in OE *strican* (P 1028), just as under *ter-3* we find by the side of the basic meaning »rub« also the meaning »strike«, e. g., in W. *taro* (P 1072). From this we may conclude that almost certainly there exists a genetic relation between *stel-2* and *tel-2* on the one side, and between *ster-4* and *ter-3* on the other. Since it is not only **L** that may develop from clicks, but also **R** [51], 35—36, *stel-* and *ster-* probably represent two variants of the inspiratory transformation of the original clicks, parallel to the radical morphemes *sel-* in Lith. *salti* (P 899) and *ser-* in Skt. *sisarti* (P 909) in the meaning »run« or rather to the radical morphemes *sel-* in Grk. *heleîn* (P 899) and *ser-* in Grk. *harpádzēin* (P 912) in the meaning »take, rob«. But the special quality of the **R** articulation in comparison to the **L** articulation has, in the case of *ster-* and *stel-* more distinctly as elsewhere, divided the two doublets into »rough« and »smooth«.

In opposition to the inspiratory or rather semi-clicking meanings just discussed, »strew, spread« occurring in *ster-5* under 9.34 is a decidedly expiratory meaning. Under (*s*)*teu-1* we have already quoted OHG *stioiban* »fly about, sprinkle, scatter« as an example of a transition from a stopped, inwardly directed breath to and unstopped, outwardly directed breath, and called attention to the coexistence of both meanings under *dheu-4*. By way of typical examples of the »extraverted« meaning we may add with the root *dheu-4* Skt. *dhvam*sati* »it flies about, scatters, falls to pieces«, *dhvasira-* »covered with dust, sprinkled with water« (P 269), and with the root (*s*)*teu-1*

ON *stökkva* »to move quickly, spout, burst« (FaT 1168). In all these cases we have to do with powerful emissions of air which — and this clearly points to the oral origin of the image — are optionally accompanied by the ejection of a liquid (**O1**). The same image appears under *ster-5* and *ster-4*. Thus we can find, for instance, under *ster-5* *SCR. strcati* »spout« and *OE stregdan*, which means beside »spout« also »strew« and »distribute« (P 1030). Under *ster-4*, on the other hand, we get *Sw. stril* »a small jet of water«, *MHG strām*, which means also »stream«, *Norw. strik*, which means also »stroke of wind«, and *ON styrkr* »strong wind« (1028—9). The origin of the meaning »strew, spread out« seems to be explained. We get, however, an additional information under (*s*)*ter-1* by *OHG stürzen*, *MHG stürzen* »fall vehemently, make fall, throw down, pour out« beside »dismay, disconcert« (P 1024). Similarly, *NE start* has, beside the basic meaning »make sudden movement from pain, surprise, etc.« also the specific nautical meaning »pour out (liquor) from cask« (COD' s. v.). *OHG stürzen* contains already all the elements of the image occurring under *ster-5* and *ster-4* and it is clearly demonstrated by it that the meaning »spread out« has come from »strew«, and »strew« from »spout, sprinkle«. On the other hand, since we have beside *ster-* »strew, spread« also the doublet *stel-* in *ChSl stlāti* »spread« (P 1019), *Slov. stlāti* »scatter the litter« (Plet. 2.577), we can see that this *stel-* is in fact identical with (*s*)*tel-1*, e. g., in *Grk. stalássō* »let run, let flow; trickle, drip« (P 1018). As the meaning »fall« appears simultaneously with »pour out« in *OHG stürzen*, the derivation of this meaning from »spout, sprinkle« (**D1s** from **O1**) has to be considered also for *W. syrthio* under 10.23, besides a direct derivation from the image of a movement downwards and backwards (**D1s**, **I1s**) or the assumption of a secondary transformation of the meaning »pressing against«.

68. The state when in the human consciousness the perception of the expiration and that of the corresponding expiratory articulation were joined has opened new wide possibilities for a further development of the imitation system. But the most decisive step was made when a bipartite image of the expiration had taken shape: as the emission of the air on the one hand (**O1**) and as a break through a stopping closure, as an explosion, on the other (**O1** from **I3**, **O3** or from the »interior« **O1s**). It is not a coincidence that we came across the image of a break through a closure in morphemes denoting the ejection of mixed air and liquid. In this case, especially the break through the closure causes a perception of vibration and of a repeated touch throughout the closure which gives a still more distinct image of the explosion. Again it is obvious that the role played by the third morphemic element **R** in the root *ster-* is important. If in the »rubbed« stroke **R** represented the »rough« element, in the meaning of explosion it represents the denotation of vibration and of a plural touch. All these imitative values of **R** have been listed already under 26—31. But the image of the explosion itself is again bipartite: the break through the closure automatically includes the opening of the closure, the splitting of the closure into two parts. Both these elements are joined in the meaning »burst«, which is found in *ON stökkva* with the

root (s)teu-1 and which is the basic meaning with »break« and »tear« in their intransitive sense.

We have thus covered a long series of the meanings containing the **ST** characteristic. Beside the numerous meanings which point to the inspiratory articulation, and others which are doubtlessly on the transition from a clicking to an inspiratory articulation, there are numerous meanings containing the **ST** characteristic for which we must already suppose an expiratory articulation. If we list them once more together, these are: thrust; resist, struggle against — to which we must add be swollen, swell; exert, strain oneself; draw; spout, sprinkle; fall (partly); and burst. It is significant that in these meanings the occurrence of the bare **T** characteristic beside the **ST** characteristic has the same and perhaps even a greater consistency than in non-expiratory meanings. The corresponding morphemes are classified either under the radical forms with no shifting **S** or under the radical morphemes with the initial **T**. The meaning »push, thrust« in Dan. støde from (s)teu-1 in the set 10.67 has a **T** parallel in Skt. tundatē and Lat. tundere; the same meaning in Boh. strkati has a parallel in Slov. trkati (Plet. 2.692). On the other hand Boh. strkati which is assigned to ster-5 has a parallel with **T** in Lat. trūdere from the root ter-3 and a still more near one in Lett. treksne »thrust« from the root (s)ter-1 without a shifting **S** (P 1090). The meaning »struggle against« beside the meaning »exert oneself« in Norw. sterra (P 1022) from the same root (s)ter-1 has a parallel with **T** in ON thrjótr »a stubborn person«, again from the root ter-3 (P 1095). The meaning »be swollen« which is derived from »be strained, tensed« (**I3, O3**) is found under (s)ter-1 with **S** in MHG storzen (P 1024), and without **S** in ON thrütinn »swollen« (P 1027). The meaning »exert, strain oneself« above in Norw. sterra with **ST** from (s)ter-1 occurs with **T** in OE droht »strain« (P 1090) from the same root and in ChSl. trud »effort, strain, toil« from the root ter-3 (P 1096). The meaning »draw« in Ir. srengim from (s)ter-1 under 9.33 has a **T** parallel in Lith. traukti ibidem, as well as in SCr. trgnuti »withdraw« which, together with the former, comes from the root ter-3 (Vuk 770, P 1073—4). The meaning »spout, sprinkle« in SCr. strcati and OE stregdan from (s)ter-1 to all appearance recurs without **S** in Lith. tręsti »dung« from (s)ter-8 (P 1032); that the basic image is the same is shown for instance by Arm. t*or- under this last root, the general, neutral meaning of which is »that flows down, that drops«. The meaning »fall« in W. syrthio under 10.23 and in OHG sturzen from (s)ter-1 has a parallel with **T** in Ir. do-tuit from (s)teu-1 ibidem. And finally, beside ON stökkva with **ST** from the same (s)teu-1 in the meaning »burst« stands with **T** Lith. trukti »tear, break, burst« (all intransitive), which once more comes from ter-3 (P 1074).

These parallels of the **ST** and **T** characteristics are joined by a great number of others as soon as we take **T** not merely as **t** but as a dental of any kind. East Fris. dufen etc. »thrust« from dheubh- has already been mentioned under 65. In the same meaning with the **TR** characteristic, but with a voiced dental, we get Lett. durt »string, thrust« beside Lith. durti »sting« in the root der-4 (P 203, 208); here may also belong the meanings »punch,

stab, kick« in Russ. *udarit'* from the same root, provided they are not transferred secundarily from the meaning »strike« (Bern. 1.179). »Exert, strain oneself« is probably the basic image of the root *derθ-* »work« in Grk. *drēstēr* »worker, servant«, *drāō* »I make, I do« (P 212) and in Lith. *daryti* under 9.11 do, make. With an initial *dh-* instead of *d-* we have a synonym in the root *dherbh-* »work« (P 257), where we find OE *deorfan* »work; perish« and *gedeorf* »work, toil«. That in both cases we have to do with the imitation pattern I3, O3 with the image of the stopped breath and of the tongue pressed against the alveoli, is suggested also by the parallel Grk. *kámnō* »work, toil, be weary« with the KN characteristic of straining, which appears in the weakened meaning »do, make« under 9.11 (Linguistica VI, 1964, 26). And surprisingly enough we find, beside the root *werg'-2* which is the basis of Goth. *waurkjan* and of NE *work* in the same set, the homonymous root *werg'-3* »be swollen, swell, be full of juice, strength, or anger« (P 1169) which in its meaning precisely corresponds to the above quoted MHG *storzen* and ON *thrütinn*. It seems that here the bare **R** characteristic has the same imitation pattern and the same basic image as the parallel **TR** characteristic. In this connection it should be remembered what was said about »pressing« and »work« under 35 with the roots *g'en* and *mag'-*. The meaning »draw« occurs with the voiced dental and **R** in Dan. *traekke* from MLG *trekken* under 9.33; from the same root *der-4* comes, for instance, also Russ. *dergat'*, »pull, tug, pull, out« (P 210) whereas NE *draw* comes from *dherāgh-* (P 257). The meaning »spout, sprinkle« is the basic image in the root *dher-4*, where we find Skt. *dhara* »stream, jet, drop, sperm« and in the root *dher-5*, where we come across Russ. *dristat'* »have diarrhoea« (P 256); the meaning »void excrement« occurs also in the root *der-4* in Lett. *dirst* (4.66 under SHARP). Almost overlapping with OHG *sturzen* under (s)ter-1 is OHG *trören* »trickle, make drip, throw away, which is accompanied by Goth. *driusan* »fall, fall down« and OE *droppian* »drop«, all belonging to the root *dhreu-* in the synonymic set 10.23 under TOUCH. The meanings »drop, drip« and »fall«, reappear once more in the homeophonic root *dhreibh-* (P 274). The meaning »burst« is in fact the basic image of the root *der-4*, though the root is traditionally designated only by the causative »split« and by the specialised meaning »skin, flay«: the basic meaning »burst« is shown in Skt. *dr'n*ati* »flies to pieces, bursts« (P 206).

The enumerated meanings show particularly well how the **STR** and the **TR** characteristics overlap. To the imitation pattern of the tongue pressed against the alveoli probably also belongs *dher-2* which appears under 11.15 hold in ChSl. *držati*. This is suggested by the Sanskrit meanings of the root: hold back, hold fast, support (P 252), which are known to us from the root (s)ter-1 and from other roots with the **ST** characteristic. We remained a bit longer with these parallels in order to call attention to the remote genetic relation which must underlie all these correspondences. A genetic relation, to all appearances, does not exist only between the meanings and the characteristics for »strike« and »rub« with **STR** and **TR** as was assumed in the preceding paragraph, it seems to be wider. And this also has to be

stressed: not only there but also elsewhere the meaning of the explosion as we have it under *der-4* became connected with the meaning »strike« and the meaning »draw«, in the way that the image of the breaking of the closure from the inside into two parts was equalized with the image of breaking or tearing an object from the outside into two or more parts. Thus we get under the same roots such meanings as »burst« and »emit something« on the one hand, and »break«, »tear« on the other. This is well noticeable in the synonymic sets 9.26 break and 9.28 tear in the concept group ROUGH, and in the synonymic set 9.27 split in the concept group SMOOTH. W. *torri* »break« under 9.26 from the root *ter-3* is connected with W. *taro* »strike« under 9.21 and SCr. *trgati* »tear« from the same root under 9.28 is connected, as we have seen, with the meaning »withdraw« in the perfective form of that verb: *trgnuti*. The root *dhreu-* under 9.26 has the meaning »break (to pieces), crush, shatter« beside the meaning »drop, trickle« and »fall« which we gave above. And the root *der-4* under 9.28 does not mean only »tear« beside »burst« but also »strike« in ChSl. etc. *udariti* under 9.21. In the same way the root *del-3* has the meaning »burst« in Skt. *dalati* »bursts« (P 194) and the meaning »split« in Ir. *dlongim* under 9.27. The specific meaning of »split«, i. e., »break into parts with the plane of cleavage« as opposed to »break to pieces, crush, shatter« is again formally based on the »smoothness« of L against the »roughness« of R. As regards their mutual differentiation this may be accounted for, as already mentioned, by different transformations of clicks which imitated undisturbed or turbulent passing of a liquid through the oral tract. Yet if for L we cannot suppose any other origin than a clicking articulation, the origin of the sound R and its meanings can be attributed also to the vibrating movement of lips and tongue at the moment of a strong and sudden inspiration as well as to the quivering of the tongue pressed against the alveoli when the breath is stopped because of a strong effort. Such a development of the apical R might have been supported by the independent development of a pharyngeal and velar R in the guttural region and the established differentiation of R and L was completed by distinguishing between a »sharp« and a »smooth« explosion.

TK is the last characteristic contributing in a higher degree to the significance of T under TOUCH. Essentially, what applies to the KT characteristic applies also to TK. TK differs from the former only in so far, beside the meaning »grasp«, it often develops the meaning »touch«. Thus Lat. *tangere* from *tag-* or *teg-* under 15.71 means »touch« whereas Gr. *tetagōn* means »grasping« (P 1054). A parallel root *dēg-* is found in Goth. (at)*tekan* under 15.71 and simultaneously in ON *taka* under 11.14 *seize* and 11.13 *take*. Beside ON *taka* under 11.13 we find ON *thiggja* from the root *tek-2*, and from the same root comes Ukr. *taknuty* »touch« (P 1058). The root *dek'-1* occurs under TOUCH only in transferred meanings, but its basic meaning »take« is clearly evident, e. g., from Gr. *dōro-dōkos* »the one who receives gifts« (P 189). Accordingly, everywhere we get the same imitation pattern (O 2a). It is difficult to determine whether the type TK has developed independently from the type KT or by metathesis; in any case the same meaning

requires with the initial **K** an inspired fricative while with the final **K** it requires an inspired stop. The roots containing a diphthong instead of a vowel are possibly extensions of simpler roots. Thus the meanings »draw« in the root *deuk-* and »milk« in the root *dheugh-* in all likelihood go back to a clicking articulation and also *deik'-*, *doig'-* in 4.34 *finger* is probably related to the root *dei-l* »shine brightly, glimmer« (P 18) as this is shown by the roots in which the meaning »show« occurs beside the meaning »shine«, e. g., by the radical morpheme *k'wek'-*, *k'weg'-* discussed under 64.

69. **A survey of the imitations with other phonemes.** Since we have already exhausted the space planned for the entire explanation of the imitations, we can now dedicate only a few words to the remaining imitations. All that can be done here is to indicate their place in the imitation system, the chief outlines of which have been delineated by the analyses so far. To explain the labial imitations in the concept group **BLOW** we must start from the double significance of the phonemic characteristic **PL** in the group **BLOW** and in the group **SMOOTH**. Under **SMOOTH** this characteristic is articulatorily and semantically parallel to the **TL** characteristic in *tel-2*; it denotes flat strokes with the tongue, and transferred, flat strokes with the hand, foot, or the body. The oral images of flapping with the tongue, rendered by the characteristic **PL**, have already been mentioned under 60, where the roots *plab-*, *blat-*, and *bhel-* were discussed in passing. In the first two roots the traditional etymological science recognizes a formal and semantic relation between the strokes of the tongue and the hand: but the same relation exists also among many homonymous and homeophonic roots which are usually treated as strictly separated. The articulatory difference between **PL** and **TL** lies in the fact that the **TL** characteristic is a successor to the lateral click, whereas the **PL** characteristic is derived from a combination of the lateral and labial click. Since the lips are the softest organ of speech, the **P** element of the characteristic — in the transfer of the oral motion image to the manual motion image — seems to have been brought into connection with the softest part of the hand, i. e., with the palm balls; whereas in the transferred **TL** characteristic the **T** element stands probably for the fingers which are harder and parallel to the tongue. In both cases the **L** element represents the air — or rather, in the cases of splashing, both air and water, which at the stroke of the palm slides out from under the palm: this is an exact parallel to what happens with the saliva or a liquid when flapping with the tongue during tasting. Under **SMOOTH**, these images are conveyed above all by the root *pelō-*, and also by the roots *pel-6*, *plēi-*, and *bh(e)lēu-*. The image of sliding is predominant in the root *pelk'-*, *pelg'-* under 10.41 *creep, crawl*, and hence it is closer to the characteristic **SL** than to **TL**. Russ. *polosá* means »furrow«, and if we look at the synonymic set 8.212 under **ROUGH** which refers to this phenomenon we shall in fact find there the **SL** characteristic in Lat. *sulcus* beside two **KL** characteristics in the roots *kel-3* and *k'el-1*, and the reversed **LK** characteristic in the root *welk-1* which all render the same image of sliding. It is not difficult to recognize the described imitation patterns in

other roots with the **PL** characteristic outside the group **SMOOTH** and our statistical material, particularly in cases where **P** occurs as voiceless **p**; the fact that in these cases the primary clicking meanings are best preserved agrees with the voiceless articulation of clicks.

Beside the **PL** characteristic appearing in roots which clearly belong to the morphosemantic area of the clicking articulation, there is under **SMOOTH** a formally identical characteristic conveying a different meaning. This is the case with the **PL** characteristic in the root *bhel-1* under 4.93 *bald* which very probably contains the inspiratory imitation pattern for rendering a sudden appearing of light. This imitation pattern was outlined under 64, and it is almost certain that the majority of the Indo-European roots denoting »light« are founded in a similar way. E. g., *bhel-1* stands in the same relation to *(s)p(h)el-2* (P 987) as *weid-* (P 1125) stands to *sweid-*. But more decisive for the significance of the **PL** characteristic under **SMOOTH** is the mingling of the clicking image of a stroke with the expiratory image of a »smooth« explosion, discussed in the preceding paragraph in connection with the root *del-3*. This image of explosion appears in the root *(s)p(h)el-1* in *Skt. sphat*ati* »tears (intransitive); bursts open« and in *sphut*ati* »splits itself, bursts open, tears (intransitive)« which are parallel to the same Sanskrit meaning under the root *del-3*. Just as there, the clicking imitation of a stroke here plays the role of a causing agent of a »smooth« breaking into pieces. In this modified meaning the root *(s)p(h)el-1* under **SMOOTH** occurs four times without the shifting **S** and once with it. The agreement with the same modified meaning in the root *del-3* with the **TL** characteristic is to be seen in the fact that in three synonymic sets — under 9.27 *split*, under 7.26 *floor*, and under 18.55 *tablet* — both *(s)p(h)el-1* and *del-3* occur together.

In the concept group **BLOW** the **PL** characteristic still has in part the same clicking and inspiratory meanings as in the group **SMOOTH**. Yet in many cases the transition to the purely expiratory imitation pattern is almost finished; thus particularly in the root *bhel-3* under 10.38 *blow*, 4.51¹ *breathe*, 4.51² *breath*, 4.46 *belly*, and 12.83 *sphere*. Closest to this comes the root *bholo-* in the synonymic sets for »smell« and »smelling«, which expresses in the first place the extraverted breath. The predominance of the image of extraverted breath in various synonymic sets from the concept group **BLOW** in opposition to the image of intraverted breath under **SMELL** has already been pointed out (*Linguistica IX*, 1, 1969, 17.) This predominance is particularly striking with the phonemic characteristic **PR** where the root *bher-2* which is the most frequent radical morpheme in the group **BLOW** seems to convey exclusively expiratory, explosive images. Distinctly expiratory are also the roots with **P-U** and with **PS** and many other **P** roots; the combination of the **P** characteristic with **U** seems to have decisively contributed to its expiratory meaning. In this connection we may call attention to the table of meanings derived from »blowing« elaborated and accompanied by extensive examples from the Indo-European and other languages by W. Oehl [26], *Anthropos* 16—17, 765 ff. Though Oehl several times attributes to the expiratory images meanings which have to be explained by

inspiratory images, his emphasizing of the great role played by the images of breath in the development of language is certainly justified. The imitation pattern of strain and stopped breathing with the phonemic characteristic PN has been discussed under 33; this pattern (I3, O3) is found — beside the pattern of expiratory explosion (O1) — with the characteristic P-U, and it appears also with the characteristic SP in the synonymic set 12.63 thick (in dimension). A basic inspiratory image has to be assumed for the root bheudh- under 15.21 smell; the meaning »taste« of this root under 15.31 in the concept group SMELL points even to a mingling with a clicking image. The same characteristic PT in pet-2 under 10.37 fly, 3.64 bird, and 4.393 wing is parallel to the clicking characteristic PL in pel-1, occurring simultaneously in these synonymic sets. This reminds one of the parallelism of the homeophonic root pēd-2 with the root pelḡ- in the synonymic sets 12.71 flat, 1.23 plain, and 7.26 floor under SMOOTH. And the alternating of an inspiratory and a clicking image, found with bheudh-, reappears in the root tep- under 15.21 smell and 15.34 taste where — as under 1.81 fire — the image underlying the meaning of tep- appears to be already clearly expiratory.

70. If we wanted to begin our explanation with the genetically oldest stratum in the human speech, it would have been necessary to start with the K characteristics. Looking at our normal phonemic distribution every observer will be struck with the outstanding frequency of the gutturals which is twice as high as that of any other phonemes. This fact is in surprising agreement with the circumstance that hardly a language of the world is without gutturals, and that in those rare cases where they are absent they are represented by the glottal catch [39], 362, which is produced in the larynx and is itself a guttural in the broad sense of the term. The glottal catch and the laryngeal fricative h corresponding to it precede in the ontogenesis of speech the velar gutturals; this is clear from the predominance of laryngeal sounds immediately followed by the velar ones among the sounds which a child first produces [38], 415, 416. Further indications for the phylogenetic priority of the laryngeal and then velar consonants before all other consonants have been mentioned under 40. From the most probable existence of a primary vowel triangle a-i-u in the earliest stage of human speech we can infer that as a correlate to a in the consonant area there must have existed from the very beginning a laryngeal h [58], 12, 17. In the Bushman language, which certainly belongs to the primitive languages, there is beside the clicks a great variety of very frequent guttural consonants whereas other consonants are almost non-existent [43], 435 ff.; [51]. All these indications confirm the supposition that the outstanding frequency of the phonemic class K is best explained by seeing in it a massive link with human prehistory and with primitive undifferentiated guttural phonation common to man and animals.

Our statistical data offer other useful information about the phonemic class K. All concept groups in which the central and front consonants are significant (with the sole exception of the group TOUCH) have a negatively

significant characteristic **K** as opposed to the positively significant characteristic **K** in the concept group SHARP. Since the speech mechanism represents the integration of the systems of nutrition and respiration [27], 133, and since, as we have seen, the central oral consonants have developed from the function of nutrition, this points to the origin of the phonemic class **K** from the function of respiration, be it vital or phonic. The fact that such an opposition is missing with the group TOUCH is not in disagreement with this conclusion: this is a consequence of the higher frequencies of **KT** and **KP** which occur along with **ST** and belong to the inspiratory articulatory and morpho-semantic area. The opposition between **K** and **T** appears inside the group SHARP itself. Both the general characteristic **T** and the specific characteristic **ST**, which have a pronounced significance in the group TOUCH, are negatively significant in the group SHARP, and parallel to this **TK** and especially **KT** which joined are significant under TOUCH show a numerical inferiority in this group. These oppositions and parallelisms, beside the basic opposition between **T** and **K**, reveal the predominant role of the **T** element in the characteristics **KT** and **TK**. And the negative **K** characteristic in the group BLOW shows that, in spite of the later predominance of the expiratory imitation pattern in this group, the real origin of **P** characteristic has to be sought in the clicking morpho-semantic area hence in the function of nutrition. On the other hand, the absence of the negatively significant **K** characteristic in the concept groups ROUGH and NARROW brings these two concept groups closer to the group SHARP. The proximity between these groups is even positively confirmed by the significant characteristics **KN** under NARROW and **KR** under ROUGH. That the **KN** characteristic is based on the imitation pattern of stopped expiration has been already demonstrated, but in view of the oppositions and parallelisms discussed above, a respiratory origin is most probable also for the **KR** characteristic. To determine the place occupied by the **K** characteristic in the entire Indo-European imitation system one more statistical datum has to be taken into account: comparing the normal phonemic distribution of the REPRESENTATIVE SAMPLE with the phonemic distribution of the integrated concept groups in Table XIX we can see that in the joint distribution of our concept groups the phonemic class **K** has a lower frequency than in the REPRESENTATIVE SAMPLE, and that it is in this difference that we must see the principal cause why the two general distributions of the consonants differ. There are two places in which the joint distribution of our concept groups shows a lower frequency of the phonemic class **K**: with the two-consonant radical morphemes containing the characteristic **KL** and **LK**, and with the one-consonant radical morphemes containing the characteristic **K-I**. Here the incompleteness of the established morpho-semantic correlations as regards the **K** characteristics has to be taken into account.

71. In the concept group SHARP the general characteristic **K** relates to the denominations for sharp, pointed and loud phenomena; as a specific significant characteristic **SK** occurs beside it. This complex characteristic occurs above all in connection with the first two categories of the phenomena,

while with the phenomena of loudness it is found only seldom. The specific characteristic **KR** is significant only in the concept group **ROUGH**; since this significance coincides with a general significance of **R** it is obvious that here the **R** element is decisive for the morpho-semantic correlation with rough phenomena. Still from the fact that, of all the **R** combinations, it is only the **KR** characteristic which is significant for itself it follows that the occurrence of the **K** element in this characteristic is not accidental and that the morpho-semantic correlations **K** — »sharp, pointed« and **KR** — »rough« are mutually connected. In the introduction to the concept group **SHARP** (*Linguistica* IX/1, 1969, 36) this question was already discussed. There we established that the tactile-proprioceptive perception of roughness is frequently combined with that of sharpness, since the discontinuous prominencies of a rough surface are often at the same time sharp. Here we might try to go deeper. If both **K** and **KR** have their origin in the function of respiration we can assume that the connection of the sensation of roughness and the sensation of sharpness also has its origin in the respiratory phenomena. The semantic analysis of the radical morphemes with **KR** and **K** under **SHARP** and **ROUGH** confirms this hypothesis. It turns out — if for instance we start merely from the synonymic set 15.76 rough — that the meaning of roughness is associated with the phenomenon of convulsive, shuddering inspiration and with unpleasant »rough« inspiratory phenomena such as rattling in the throat, snoring on the one hand, and with phenomena of harsh crying and hoarseness, i. e., of primitive phonation on the other. Proceeding in the inquiry about the semantic connections of the meaning »rough« we meet further with respiratory and other ejections, such as hawking, belching, retching, and the like. With all these phenomena the sensation of roughness normally implies the sensation of sharpness and pain, especially in the case of violent harsh crying out or ejection. Thus the double meaning of »rough and sharp«, originated in the oral area, is transferred to denominations of manual activities and other phenomena, displaying a **KR** characteristic. The ultimate origin of the imitative **R** in this specific characteristic comes probably from the primitive reflex mechanism of extreme laryngeal closure and the simultaneous vibration of the supraglottic elements present in the physiological alarm cry of panic or any other strong emotional cry (27). In the denominations of sharpness with the bare **K** characteristic a similar development of meaning has to be assumed in view of the fact that the same semantic connections with the described respiratory phenomena occur also here. So with crying the stress is laid upon the violent bursting open of the closed glottis, and with ejection the stress is on the same or on similar violent opening of the oesophagus. These primary images are transferred to denominations of »sharp« manual activities and other phenomena including sensations of sharpness and pain; the origin of the »sharp« **K** characteristic — and also of the inspiratory fricative **K** characteristic treated under 64 — must to all appearance be sought in the same physiological processes which gave birth to the **KR** characteristic. As regards the sensation of sharpness it would be useful to establish whether the articulation of laryngeal and

velar plosives in itself is proprioceptively perceived more intensively than the articulation of other plosives in relation to the neuro-muscular structure of the organs of speech.

The significant **K** characteristic with an initial **K** under SHARP does not include only the **KR** characteristic but also the parallel characteristics **KL** and **KN**. Their mutual relations — the specific meaning »pressing« of **KN** being let apart — are best shown with the meanings referring to loudness, alternatively expressed by these characteristics. A survey of the corresponding roots discloses that in spite of a secondary semantical equalizing the roots having a rough **KR** characteristic of crying were originally clearly opposed to the roots with the smooth and continuously echoing **KL** and **KN**. This was already shown for the examples of crying and singing under 27. Here we may add another suggestive example. In Slovenian we get a clear opposition between *kričati* »cry, shout« from the root *ker-1* under 18.13 and *klicati* »call« from the root *kel-6* in the same synonymic set (Plet. 1.467, 406). Also if we examine in Berneker's etymological dictionary all the corresponding Slavic meanings under *krikъ* (1.616) on the one hand, and *kliknъ* (1.519) on the other, we can see that the meaning »cry, shout« predominates under the former entry, and the meaning »call, announce«, under the latter. The smooth *klik-* renders moreover the sounds made by the birds which actually have smooth, ringing voices, as the eagle, the woodpecker, the swan; while the rough *krik-* renders the sounds made by the birds which have rough or vibrating voices, as the crane and the thrush.

But if in these imitations the voiced **R** and **N** are probably original, **L** after all that has been established concerning its origin is certainly secondary. The essential difference between the **L** as a central oral consonant which has developed from a click, and the **L** here lies in its voicedness. The way how this transition came about is not evident from our statistical material, but it might be remembered that a gap appeared exactly with the characteristics **KI** and **LK**. And if we examine more closely the Tables XVII and XVIII and the tables for SMOOTH, SMELL, and TOUCH we can see that it is **KL** and **LK** (both numerically superior) which caused that the group SMOOTH has retracted from the groups SMELL and TOUCH and moved closer to the group NARROW. The characteristic **KL** as a successor to the lateral click is parallel to the characteristics **TL** and **PL**, but it is articulated most backward in the mouth cavity. It seems that this characteristic has passed first to the imitation of gurgling (»clucking«) and of smooth swallowing, especially of liquids, and only later to the imitation of smooth sounds, acquiring step by step its final voicedness. In this connection we might point out the fact that in the articulation of **L** a distinct lowering of the entire larynx may be observed [34], 114, and that, on the other hand, particularly the gulping of water causes in general a similar downward movement of the larynx [51], 55. The characteristic **LK** denoting swallowing came into existence probably through a metathesis from **KL**; but it may also originate from a three-consonant characteristic **SLK** combining the characteristic **SL** with the inspiratory characteristic **K**.

72. From all that we know about the role of the phoneme **S** which appears in the complex characteristic **SK**, we must suppose for it the derivation from an originally clicking and a later inspiratory sound. A comparative semantic analysis of the roots *sker-*, very frequent under **SHARP** and **ROUGH**, shows semantic relations which are very similar to the semantic relations with the roots *ster-* and, it may be added, the roots *sper-*. Here as well we come across, for instance, the basic images of striking and rubbing, of convulsive inspiration and violent, vibrating explosion. These images are modified only so much that they are normally accompanied by a distinct element of sharpness; hence instead of general striking we get mostly »chopping, digging«, etc., and instead of rubbing mostly »scratching« and »cutting with a knife«. The image of convulsive inspiration appears repeatedly in the meaning »spasm, cramp« and the meaning of explosion, ejection in the meaning »excretion«, both with a clear connotation of sharpness and pain. The last meaning is found also with the **K** characteristic, as is evident from the set 4.66' under **SHARP**. Without the **R** element the characteristic **SK** occurs in the radical morpheme *sĕk-2* which is the most strongly represented root in this concept group. This root is in the same relation to the root *ak'-2*, as (s)*ker-4* (P 938) with the shifting **S** to (s)*ker-4* without the shifting **S**. If we bear in mind the great importance which the articulatory direction of the sounds has in the linguistic imitations of the movements, we can see the role of **S**. The sharp movement represented by **K**, directed originally in the forward direction, was by the clicking predecessor of **S** directed downwards parallel with the movement of the arm when striking. The inspiratory **S** then indicated the direction back towards oneself with the restrained movements of scratching and cutting with the knife. Though the two-consonant roots with an initial **K-** are independent from the corresponding three-consonant roots with an initial **SK-**, it is nevertheless in connection with the latter only that they seem to have acquired all their parallel motion meanings.

In the formation of the **SK** characteristic another radical morpheme was involved: (s)*ka*p-* (P 930). This root is most probably related to the inspiratory roots *kap-* and *ghabh-*, discussed under 64. The unstopped movement of the mandible and the lips upwards when grasping something with force (**Uls**) changed into the reverse movement of the lips and mandible downwards parallel to a downward movement of the arm (**Dls**). Here also the combination of a click with the guttural was decisive for the determination of the direction. Yet the phonemic combination **K — short A** both with the roots *kap-*, *ghabh-* and the root (s)*ka*p-* shows something else. The articulation of gutturals already implies a slight lowering of the mandible; with the exception of **R** and **L** this does not happen with other consonants [15], 419. If **A** is also present, the downward movement of the mandible is much more accentuated. The movement expressed with **K — A** helped thus in its way to the formation of the meaning of a downward strike in the root (s)*ka*p-*; the radical form (s)*ka*p-* was probably only later joined by the form (s)*ke*p-* through analogy with other morphemes of original neutral vocalisation.

The articulatory feature of the lowered mandible common to **K** and **A** which leads to their preferential combination appears already in the radical morpheme *ak'-2* and is the source of the significance of the characteristic **K** — short **A** in the concept groups SHARP and ROUGH. The positive significance of any short vowels in both groups suggests that the central vocalisation — be it with a short **A** or a short **E** — prevailing in the Indo-European roots, has taken shape in the first line with the roots containing a guttural or a guttural **R**.

73. The question concerning the role of the different quality of the vowels in the Indo-European imitation system finds at least a partial answer through our findings under SHARP and ROUGH. Beside the imitative value of **U** which is proved by the significance of the **U** characteristic in the groups SMELL and BLOW, we can claim an analogous imitative value for **A**. All these values have a distinct motion character. The characteristic **U** renders protruded forward pushed lips which move either in the outward or in the inward direction but always on the same sagittal line. The characteristic **A**, on the contrary, conveys the image of a widely open mouth, either as a starting point for an upward movement or as a result of a downward movement, yet always on the same vertical line. Both characteristics have a feature in common: they represent maximal articulatory movements and extreme positions of the speech organs. Although our material gives no statistically significant information about the **I** characteristic, it can be assumed from many instances that this characteristic represents the third maximal articulatory movement and the third extreme position of the speech organs which is possible, i. e., the pronounced extending of the lips and all supralaryngeal parts of the speech organs to both sides in a transversal line (30). This concludes the picture of the basic motion values of the characteristics **A-I-U***; it goes without saying that they are accompanied by other, especially synergistic motion values, as well as by the auditory ones. The fourth vowel which we must assume already for the pre-Indo-European period, i. e., **E**, plays in the imitation system the role of a neutral element of vocalisation and, in view of its non-maximal articulation, has no motion value or auditory value of distinct quality.

74. Many readers probably will be of opinion that the hypotheses brought forward here to explain our statistical results are too many and that the evidence in many cases is too scarce. We ask them to consider the subjective

* At this stage of investigation the evolution from the supposed primary vowel triangle **a-i-u** to the Indo-European radical diphthongs **ai, āi, ei, ēi, au, āu, eu, ēu**, etc. beside the unreduced radical vowels **i** and **ū** remains unclear. Does the Indo-European state result from diphthongizations or extensions, or from both? This problem is closely connected with the fundamental yet unsolved question of syllable formation in pre-Indo-European, i. e., with the genetical relationship between the various root types, especially between the types **CV** and **CVC**. The articulatory-auditory features of **i** and **ū**, either in their vowel or semi-vowel function, are in any case identical (8). See also [58] and [59].

circumstances referred to at the beginning and above all the objective disadvantage consisting in the fact that our investigation was necessarily limited to the sole family of the Indo-European languages. Thus a comparison of morpho-semantic facts on a larger scale was prevented which would permit us to avoid mistakes. But we are firmly convinced that the chosen method of investigating the correlation between sound and meaning — and the same time the genesis of human speech — is the right one, and that in spite of possible errors in our interpretation it should be applied systematically to other language groups. Reassuring, the cardinal points of the method are: 1) the statistical treatment of independent synonyms; 2) the systematic establishing of the denotative chains connecting the single members of the synonymic sets; 3) the formal comparison of the linguistic morphemes and the extralinguistic phenomena denoted by them; 4) the preferential attention given to the comparison of the linguistic morphemes with the primary physiological functions of respiration and nutrition from which the human speech originates; 5) the investigating of relevant neuro-physiological connections existing in the human body, especially of synergism; 6) the synthesis of linguistical, biological, psychological, anthropological, cybernetical and other scientific findings belonging together. Applied on a large scale by team work and interdisciplinary collaboration these investigations would certainly lead to a considerable progress in our knowledge about language, its complex structure and its beginnings.

To point 5) we may add a reference found after the finishing of the manuscript. In the electrocorticograms made by H. Jasper »the [encephalic] beta rythm from the face area of the precentral gyrus was blocked with the hand area during initiation of a strong contraction such as clenching the first, suggesting« — according to the eminent neurophysiologist — »some spread of the blocking effect throughout the motor system, related possibly to synergistic contractions« [63], 22. Very probably analogous findings could be multiplied by specific electrocorticographic as well as electromyographic investigations.

TABLE 1 a
REPRESENTATIVE
SAMPLE

	R	L	N	K	T	P	S	
S	7	15	28	54	63	23	0	190
P	58	43	16	25	23	2	7	174
T	51	14	20	38	0	6	1	130
K	112	68	47	6	28	19	10	290
N	12	13	29	25	12	1	2	94
L	1	0	4	38	6	9	4	62
R	0	0	2	11	9	5	1	28
	241	153	146	197	141	65	25	968

TABLE 38 a
SHARP

	R	L	N	K	T	P	S	
S	12	19	33	93	26	33	0	216
P	42	28	12	33	16	0	9	140
T	49	33	9	24	0	0	0	115
K	164	79	42	24	5	28	42	384
N	5	7	0	28	14	3	2	59
L	0	0	0	12	0	9	0	21
R	0	0	5	18	5	2	3	33
	272	166	101	232	66	75	56	968

TABLE 39 a
SHARP

	R	L	N	K	T	P	S	
S	5	8	14	40	11	14	0	92
P	18	12	5	14	7	0	4	60
T	21	14	4	10	0	0	0	49
K	70	34	18	10	2	12	18	164
N	2	3	0	12	6	1	1	25
L	0	0	0	5	0	4	0	9
R	0	0	2	8	2	1	1	14
	116	71	43	99	28	32	24	413

TABLE 3 a
ROUGH

	R	L	N	K	T	P	S	
S	17	21	4	70	25	33	0	170
P	91	25	4	30	4	0	8	162
T	79	8	0	25	0	0	0	112
K	233	54	38	28	4	21	17	395
N	4	8	0	26	8	4	0	50
L	0	0	8	25	0	9	0	42
R	0	0	8	12	13	4	0	37
	424	116	62	216	54	71	25	968

TABLE 8 a
ROUGH

	R	L	N	K	T	P	S	
S	4	5	1	17	6	8	0	41
P	22	6	1	7	1	0	2	39
T	19	2	0	6	0	0	0	27
K	56	13	9	7	1	5	4	95
N	1	2	0	6	2	1	0	12
L	0	0	2	6	0	2	0	10
R	0	0	2	3	3	1	0	9
	102	28	15	52	13	17	6	233

TABLE 13 a
NARROW

	R	L	N	K	T	P	S	
S	0	12	49	12	45	16	0	134
P	33	53	36	32	0	0	21	175
T	65	16	20	41	0	4	0	146
K	102	32	98	0	4	12	8	256
N	12	33	53	86	16	0	12	212
L	0	0	4	21	0	0	0	25
R	0	0	0	16	0	0	4	20
	212	146	260	208	65	32	45	968

TABLE 17a
NARROW

	R	L	N	K	T	P	S	
S	0	3	12	3	11	4	0	33
P	8	13	9	8	0	0	5	43
T	16	4	5	10	0	1	0	36
K	25	8	24	0	1	3	2	63
N	3	8	13	21	4	0	3	52
L	0	0	1	5	0	0	0	6
R	0	0	0	4	0	0	1	5
	52	36	64	51	16	8	11	238

TABLE 2a
SMOOTH

	R	L	N	K	T	P	S	
S	14	67	41	45	50	13	0	230
P	36	108	23	9	40	0	9	225
T	45	50	22	5	0	0	0	122
K	45	99	13	5	23	9	0	194
N	18	18	5	27	4	0	0	72
L	0	0	22	54	9	18	0	103
R	0	0	0	4	18	0	0	22
	158	342	126	149	144	40	9	968

TABLE 7a
SMOOTH

	R	L	N	K	T	P	S	
S	3	15	9	10	11	3	0	51
P	8	24	5	2	9	0	2	50
T	10	11	5	1	0	0	0	27
K	10	22	3	1	5	2	0	43
N	4	4	1	6	1	0	0	16
L	0	0	5	12	2	4	0	23
R	0	0	0	1	4	0	0	5
	35	76	28	33	32	9	2	215

TABLE 17 a
NARROW

	R	L	N	K	T	P	S	
S	0	3	12	3	11	4	0	33
P	8	13	9	8	0	0	5	43
T	16	4	5	10	0	1	0	36
K	25	8	24	0	1	3	2	63
N	3	8	13	21	4	0	3	52
L	0	0	1	5	0	0	0	6
R	0	0	0	4	0	0	1	5
	52	36	64	51	16	8	11	238

TABLE 2 a
SMOOTH

	R	L	N	K	T	P	S	
S	14	67	41	45	50	13	0	230
P	36	108	23	9	40	0	9	225
T	45	50	22	5	0	0	0	122
K	45	99	13	5	23	9	0	194
N	18	18	5	27	4	0	0	72
L	0	0	22	54	9	18	0	103
R	0	0	0	4	18	0	0	22
	158	342	126	149	144	40	9	968

TABLE 7 a
SMOOTH

	R	L	N	K	T	P	S	
S	3	15	9	10	11	3	0	51
P	8	24	5	2	9	0	2	50
T	10	11	5	1	0	0	0	27
K	10	22	3	1	5	2	0	43
N	4	4	1	6	1	0	0	16
L	0	0	5	12	2	4	0	23
R	0	0	0	1	4	0	0	5
	35	76	28	33	32	9	2	215

TABLE 3a
ROUGH

	R	L	N	K	T	P	S	
S	17	21	4	70	25	33	0	170
P	91	25	4	30	4	0	8	162
T	79	8	0	25	0	0	0	112
K	233	54	38	28	4	21	17	395
N	4	8	0	26	8	4	0	50
L	0	0	8	25	0	9	0	42
R	0	0	8	12	13	4	0	37
	424	116	62	216	54	71	25	968

TABLE 8a
ROUGH

	R	L	N	K	T	P	S	
S	4	5	1	17	6	8	0	41
P	22	6	1	7	1	0	2	39
T	19	2	0	6	0	0	0	27
K	56	13	9	7	1	5	4	95
N	1	2	0	6	2	1	0	12
L	0	0	2	6	0	2	0	10
R	0	0	2	3	3	1	0	9
	102	28	15	52	13	17	6	233

TABLE 13a
NARROW

	R	L	N	K	T	P	S	
S	0	12	49	12	45	16	0	134
P	33	53	36	32	0	0	21	175
T	65	16	20	41	0	4	0	146
K	102	32	98	0	4	12	8	256
N	12	33	53	86	16	0	12	212
L	0	0	4	21	0	0	0	25
R	0	0	0	16	0	0	4	20
	212	146	260	208	65	32	45	968

TABLE 30 a
SMELL

	R	L	N	K	T	P	S	
S	14	32	112	14	46	14	5	237
P	65	37	14	9	28	0	9	162
T	37	19	23	32	5	28	0	144
K	74	61	19	5	51	28	37	275
N	14	41	14	14	24	5	9	121
L	0	0	0	0	5	19	5	29
R	0	0	0	0	0	0	0	0
	204	190	182	74	159	94	65	968

TABLE 31 a
SMELL

	R	L	N	K	T	P	S	
S	3	7	24	3	10	3	1	51
P	14	8	3	2	6	0	2	35
T	8	4	5	7	1	6	0	31
K	16	13	4	1	11	6	8	59
N	3	9	3	3	5	1	2	26
L	0	0	0	0	1	4	1	6
R	0	0	0	0	0	0	0	0
	44	41	39	16	34	20	14	208

TABLE 14 a
TOUCH

	R	L	N	K	T	P	S	
S	6	12	18	38	119	18	0	211
P	50	33	12	15	32	0	9	151
T	83	21	32	60	3	15	0	214
K	86	41	15	0	51	41	12	246
N	6	6	6	38	6	0	9	71
L	0	0	0	36	0	9	0	45
R	0	0	6	15	9	0	0	30
	231	113	89	202	220	83	30	968

TABLE 18 a
TOUCH

	R	L	N	K	T	P	S	
S	2	4	6	13	40	6	0	71
P	17	11	4	5	11	0	3	51
T	28	7	11	20	1	5	0	72
K	29	14	5	0	17	14	4	83
N	2	2	2	13	2	0	3	24
L	0	0	0	12	0	3	0	15
R	0	0	2	5	3	0	0	10
	78	38	30	68	74	28	10	326

TABLE 23 a
BLOW

	R	L	N	K	T	P	S	
S	0	4	77	9	43	25	0	158
P	120	107	34	43	30	0	47	381
T	13	0	4	21	9	30	0	77
K	120	34	30	4	22	34	0	244
N	17	13	0	13	12	5	0	60
L	0	0	0	22	0	17	0	39
R	0	0	0	0	9	0	0	9
	270	158	145	112	125	111	47	968

TABLE 24 a
BLOW

	R	L	N	K	T	P	S	
S	0	1	18	2	10	6	0	37
P	28	25	8	10	7	0	11	89
T	3	0	1	5	2	7	0	18
K	28	8	7	1	5	8	0	57
N	4	3	0	3	3	1	0	14
L	0	0	0	5	0	4	0	9
R	0	0	0	0	2	0	0	2
	63	37	34	26	29	26	11	226

TABLE XVII
Normalized

REPRES. SAMPLE

	b	a	c	
c	252	117	125	c
a	227	6	57	a
b	61	74	49	b
	b	a	c	

SHARP

	b	a	c	
c	237	150	84	c
a	285	24	75	a
b	17	58	38	b
	b	a	c	

ROUGH

	b	a	c	
c	249	125	70	c
a	325	28	42	a
b	28	63	38	b
	b	a	c	

NARROW

	b	a	c	
c	284	85	86	c
a	242	0	24	a
b	102	113	32	b
	b	a	c	

SMOOTH

	b	a	c	
c	406	59	112	c
a	157	5	32	a
b	63	85	49	b
	b	a	c	

SMELL

	b	a	c	
c	353	55	135	c
a	154	5	116	a
b	69	14	67	b
	b	a	c	

TOUCH

	b	a	c	
c	267	113	196	c
a	142	0	104	a
b	24	89	33	b
	b	a	c	

BLOW

	b	a	c	
c	359	73	184	c
a	184	4	56	a
b	30	35	43	b
	b	a	c	

TABLE XVIII
Actual

REPRES. SAMPLE

	b	a	c	
c	252	117	125	c
a	227	6	57	a
b	61	74	49	b
	b	a	c	

SHARP

	b	a	c	
c	101	64	36	c
a	122	10	32	a
b	7	25	16	b
	b	a	c	

ROUGH

	b	a	c	
c	60	30	17	c
a	78	7	10	a
b	7	15	9	b
	b	a	c	

NARROW

	b	a	c	
c	70	21	21	c
a	57	0	6	a
b	25	30	8	b
	b	a	c	

SMOOTH

	b	a	c	
c	90	13	25	c
a	35	1	7	a
b	14	19	11	b
	b	a	c	

SMELL

	b	a	c	
c	76	12	29	c
a	33	1	25	a
b	15	3	14	b
	b	a	c	

TOUCH

	b	a	c	
c	90	38	66	c
a	48	0	35	a
b	8	30	11	b
	b	a	c	

BLOW

	b	a	c	
c	84	17	43	c
a	43	1	13	a
b	7	8	10	b
	b	a	c	

TABLE XIX*

A) The Chi-square results for consonant pairs, distinguishing only three phonemic elements a, b, and c, as in tables XVII and XVIII

SHARP	ROUGH	NARROW	SMOOTH	SMELL	TOUCH	BLOW
39.478	27.057	26.491	35.179	39.954	49.296	32.035

B) Significant r. m. s. deviations for the groupings of consonant pairs, distinguishing only three phonemic elements a, b, and c, as in tables XVII and XVIII

SHARP	ROUGH	NARROW	SMOOTH	SMELL	TOUCH	BLOW
4.70	3.30	3.79	3.19	3.87	4.33	3.83
10.16	7.63	7.12	6.81	7.00	8.76	7.30

C) The Chi-square results for the integrated distributions of consonant pairs in the seven concept groups SHARP to BLOW

KK etc.	KR + rk	KN + nk	nn	SN + ns	sl etc.	KL + lk
+ 2.899	+ 0.106	+ 0.027	— 19.105	+ 7.920	+ 4.500	— 9.480
PL + lp	PT + tp	sp + ps	pk + kp	PR + rp	SK + ks	ST + ts
+ 3.404	+ 0.052	+ 4.443	+ 0.775	— 0.254	+ 0.012	— 2.980
		TK + kt	TR + rt	tn et.		SUM
		— 2.376	+ 0.340	+ 0.125		58.798

D) The Chi-square results for the integrated distributions of the singly appearing consonants in the seven concept groups SHARP to BLOW

K	R	N	L	S	T	P
— 11.464	+ 1.819	— 0.273	+ 1.769	+ 3.438	— 1.20	+ 5.934
						SUM
						24.817

E) The Chi-square results of the integrated general distribution of consonants in the seven concept groups SHARP to BLOW

K	R	N	L	S	T	P
— 8.411	+ 1.047	— 0.316	+ 0.058	+ 5.689	— 1.794	+ 7.346
						SUM
						24.661

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* Notes to Table XIX:

At the probability level $P = 0.001$ the non-significant Chi-square for the distribution under A — taking eight degrees of freedom — is 26.125.

The right lower figure under B is the determined standard deviation, and the left upper figure is the number of standard deviations.

At the probability level $P = 0.001$ the non-significant Chi-square for the distributions under D and E — taking six degrees of freedom — is 22.457. At the same level the non-significant Chi-square for the distribution under C — taking fortythree degrees of freedom — is 77.419.

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POVZETEK

Drugi, sklepni del razlage se nanaša na posamezne signifikantne glasovne karakteristike: na njihovo imitativno vrednost in njihov nastanek iz elementarnih fizioloških funkcij hranjenja in dihanja.