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## AN EXPERIMENTAL STUDY OF NAMING

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The nature of the relationship between an object and its name has interested thinkers since early times. At a period as early as that of the Greeks, there was much speculation about this general problem, the Sophists denying the possibility of any objective interconnection between object and name, and the Stoics affirming the objective validity of words.<sup>1</sup> A more particular question has been formulated by Jespersen as follows: "Is there a natural interconnection between sound and meaning? Do words acquire their meanings through sound-symbolism?"<sup>2</sup> Even in a work dating from the fourth century B.C., Plato's dialogue *Kratylos*, we note an attempt to find in the sounds of certain letters of the alphabet bases for names, e.g., *rho* and *iota* are said to express motion, and *lambda* smoothness.<sup>3</sup> Since linguistic historians in modern times have been occupied chiefly with words which have already undergone extensive phonetic and semantic change, it is intelligible that many of them should have rejected entirely the possibility of sound-symbolism in names.

Perhaps no linguist has so clearly represented the view that all names are conventional as William Dwight Whitney, who writes: "Inner and essential connection between idea and word, whereby the mind which conceives the one at once apprehends and produces the other, there is none, in any language upon earth. Every existing form of human speech is a body of arbitrary and conventional signs for thought."<sup>4</sup> In commenting on this view, Jespersen says, "There is no denying, however, that there are words which we feel instinctively to be adequate to express the ideas they stand for, and others the sounds of which are felt to be more or less incongruous with their signification." Jespersen lists several classes of sounds adapted

\* Accepted for publication June 1, 1933. From the Psychological Laboratory of Cornell University.

<sup>1</sup> E. Cassirer, *Philosophie der symbolischen Formen: I. Die Sprache*, 1923, 132-133.

<sup>2</sup> O. Jespersen, *Language: Its Nature, Development and Origin*, 1922, 396.

<sup>3</sup> B. Jowett, *The Dialogues of Plato translated into English*, etc., 1, 1892, 372-373.

<sup>4</sup> W. D. Whitney, *Language and the Study of Language*, 1867, 32.

to express certain notions symbolically, e.g. the vowel *i* (pronounced as in *little* or like the *ee* in *wee*) "is particularly appropriate to express what is small, weak, insignificant, or, on the other hand, refined and dainty."<sup>5</sup>

Von Hornbostel has applied his general doctrine of the 'unity of the senses' to the problem of name-symbolism. The general principle he has formulated as follows: "Das Wesentliche des Sinnlich-Anschaulichen liegt nicht in dem, was die Sinne trennt, sondern in dem, was sie eint—eint unter sich, mit dem ganzen, auch nicht-sinnlichen Erleben in uns, und mit all dem draussen, was es zu erleben gibt."<sup>6</sup> He has made his position very clear in his study of brightness, in which he maintains that "brightness is not only an analogous but an identical aspect of the phenomena of the various sensory fields."<sup>7</sup> Certain psychophysical studies, which unfortunately are not reported fully by Von Hornbostel, suggest that it is possible to match in brightness sense-impressions of disparate senses (smell, audition, vision).<sup>8</sup>

Von Hornbostel has approached the problem of naming directly in another article on sound and meaning.<sup>9</sup> He maintains that the meaning of a speech-utterance is dependent at any time upon the inner and external situation of the organism. "Der Sinn bestimmt den Laut."<sup>10</sup> Even more striking is the statement, not intended to be merely figurative, that "Sprache ist tönender Sinn."<sup>11</sup> He concedes that the behavior of the 'other individual' is partly determined by *his* inner situation and *our* perception of his behavior by *our* inner situation, so that the original meaning of an expression might be transformed beyond recognition. Two facts, however, must be considered: (1) in primitive life individual differences in past experience are slight; and (2) in primitive life creatures live in a narrow spatial and temporal present. Expressed in extreme form, the theory is that such primitive individuals have a common experience. The meaning of a sound-expression, which may be one aspect of such a common experience, is the meaning of the common situation. "Der Laut ist also dem Sinn ursprünglich vollständig adäquat." No experience (*Erfahren*) is needed to understand what is heard—for the meaning is heard just as it may be seen, felt or expressed. Linguistic proto-creation (*Urschöpfung*) is necessarily rare in modern man born in a social milieu in which language is already in use, yet Von Hornbostel believes that even today we may observe such proto-creation of names, particularly of those—such as nick-names—used to characterize personalities.<sup>12</sup> After stating his theory, Von Hornbostel turns to a consideration of certain features of extant languages. He believes that the essential key to a study of sound-expressions lies in speech-melody, of which the following are the important aspects.

(1) *Intensity and rhythm.* For example, Indogermanic disyllabic roots with verbal significance have, with iambic accent, a strong, transitive, active meaning; with trochaic accent, a weak, passive, intransitive meaning.

<sup>5</sup> Jespersen, *op. cit.*, 398 ff.

<sup>6</sup> E. M. von Hornbostel, *Die Einheit der Sinne, Melos*, 4, 1924, 290-297.

<sup>7</sup> Von Hornbostel, *Über Geruchshelligkeit, Arch. f. d. ges. Physiol.*, 227, 1931, 517-538.

<sup>8</sup> Also cf. L. Székely, *Über den Aufbau der Sinnesfunktionen, Zsch. f. Psychol.*, 127, 1932, 227-264. N. E. Cohen has recently published some quantitative findings which "indicate too great a discrepancy to render the [Von Hornbostel's] hypothesis of identity plausible" (Equivalence of brightness across modalities, this JOURNAL, 46, 1934, 117-119).

<sup>9</sup> Von Hornbostel, *Laut und Sinn, Festschrift Meinhof: Sprachwissenschaftliche und andere Studien*, 1927, 329-348.

<sup>10</sup> *Ibid.*, 329-330.

<sup>11</sup> *Ibid.*, 331.

<sup>12</sup> *Ibid.*, 331-332.

- (2) *Duration* (indicating length and shortness).  
 (3) *Pitch-movement* (indicating rising and falling).  
 (4) *Pitch of the voice* (high sounds having the meaning of smallness or thinness, low sounds the meaning of bigness or thickness).  
 (5) *Vowel-brightness*. For example, the Bantu *-tetema* means "to quiver"; while *-tutuma* in the same language means "to thunder."  
 (6) *Characteristics of the consonants*. Brightness, shortness, sharpness and hardness of consonants indicate strength or activity. Dullness, length, mildness and softness indicate weakness or passivity.<sup>13</sup>

Von Hornbostel considers in detail the dullest linguistic sounds—*m*, *mb*, *omb*—as they appear in words in the Indogermanic and Semitic languages and also in Bantu and Hungarian. No perfect parallelism between sound and meaning can be expected in living languages, yet words containing *m*, *mb*, and *omb* are likely to have such meanings as these: *dull*, *dark*, *heavy*, *thick*, *to enclose*, *fat*, *damp*, *mother*, *blunt*, *hollow*, *deep*, *large*.<sup>14</sup>

Westermann has studied the 'phonetic symbolism' of certain African languages.<sup>15</sup> He limits himself to four contrasts which may be noted in the sounds of the languages which he has studied and furthermore has considered mainly only those African words which stand in meaning near the world of sense-perception. He arrives at the correlations shown in Table I. He expresses the caution that "this grouping must naturally be applied not mechanically but in accordance with the total course of speech."<sup>16</sup> The sounds considered by Von Hornbostel—*m*, *mb*, *omb*—fall in Westermann's B-series, and the characterizations given by Von Hornbostel agree closely with those found by Westermann in other languages.

Another series of studies bearing upon the problem of naming was initiated by Claparède and Kollarits.<sup>17</sup> Their problem was to determine the nature of the psychological responses to proper names of unknown persons or places. Experimental methods were applied in a group of studies from the Cornell laboratory. In the first of these, English<sup>18</sup> presented various names of individuals unknown to her subjects and asked for descriptions of the resulting experiences. Claparède had made the suggestion that the 'physiognomy' of a proper name may play a rôle in determining the meaning apprehended in it by the observer. In English's study only a few such physiognomic cases appeared, e.g. *Klemm* was reported to be a "sharp word," and *Ponsonby* to be a "heavy word." In another series, English presented nonsense names and called for descriptions of individuals who might well bear such names. The *Os* were also shown pictures of individuals for whom names were to be chosen. "If we take the 500 reports as a whole, the results are negative. There is no constant or uniform tendency among these observers either to imagine a similar type of individual for the same name, or to furnish a similar type of name for the same picture."<sup>19</sup> The results of this series suggested also that the 'physiognomy' of the name was a relatively unimportant factor.

<sup>13</sup> *Ibid.*, 337.    <sup>14</sup> *Ibid.*, 339.

<sup>15</sup> D. Westermann, *Laut, Ton und Sinn in Westafrikanischen Sudansprachen, Festschrift Meinhof*, 1927, 315-326.

<sup>16</sup> *Op. cit.*, 328.

<sup>17</sup> E. Claparède, *Sur la représentation des personnes inconnues et des lapsus linguae, Arch. de Psychol.*, 14, 1914, 301-304; K. Kollarits, *Observations de psychologie quotidienne: I. Sur les images qui accompagnent la représentation des individus et des lieux inconnus, ibid.*, 225-240.

<sup>18</sup> G. English, On the psychological response to unknown proper names, this *JOURNAL*, 27, 1916, 430-434.

<sup>19</sup> *Op. cit.*, 432.

TABLE I  
WESTERMANN'S CORRELATION BETWEEN SOUND AND MEANING

	Series A	Series B
Sound	High tone	Low tone
	Short vowel (quantity)	Long vowel (quantity)
	Bright vowel (i, e, a)	Dull vowel (u, o)
	Voiceless consonant	Voiced consonant
Meaning	Small, fine, tense, hard, solid	Large, voluminous, heavy, shapeless, soft loose, etc.
	Bright	Dull
	Quick	Slow
	Sharp, pleasant taste	Tasteless, insipid
	Pleasant smell	Unpleasant smell
	Intensive color	Dull color
	Energetic, fresh, exact	Dull, heavy, blunt, chaotic

Alspach used only one *O*, who had also taken part in English's experiment.<sup>20</sup> Fifty meaningless words were read in turn to the *O*, who was instructed to describe a person who might bear each name and to give introspective comments. In some cases, the name suggested a particular nationality. In others, a similar name was suggested, and a person bearing this latter name was described. Auditory-verbal associations were sometimes effective. *Gronch*, for example meant "a kind of surly, grouchy, piggish, selfish, self-satisfied beggar; has a thick, heavy mustache; grumbles. Thought of *grouch* and *grunts*." With 25% of English's words and 35% of Alspach's, the *O* was unaware of any such sensible associations but indicated that the mere sound of the word was the determining factor. Alspach concludes that "the sound of the name was effective in a much larger percentage of cases than former work would lead us to expect."<sup>21</sup> The words were read to the same *O* after an interval of 15 mo. The correspondence between the earlier and later reports of the *O* appeared to be greater than chance would allow.

In 1922, Fischer<sup>22</sup> published a series of two articles dealing with the psychological nature of names. He assigned arbitrary nonsense names to nonsense drawings and photographs of individuals and called for reports indicating the experienced relationships between words and objects. Fischer observed, among other things, that the word did not always become the 'name' of the object. When the word appeared as a name, a very particular experience was always involved: with the hearing or pronunciation of the word, the *O* 'meant' the object or was directed toward it.

Two years later Usnadze reported the results of another study of naming (*Namengebung*).<sup>23</sup> Since our own experiments were undertaken initially as a check upon Usnadze's, we must report the latter in some detail. Uznadze drew 6 nonsense figures; we can only guess at their nature, since he has published no examples. Each

<sup>20</sup> E. M. Alspach, On the psychological response to unknown proper names, this JOURNAL, 28, 1917, 436-443.

<sup>21</sup> *Ibid.*, 439.

<sup>22</sup> S. Fischer, Über das Entstehen und Verstehen von Namen, *Arch. f. d. ges. Psychol.*, 42, 1922, 335-368; 43, 1922, 32-63.

<sup>23</sup> D. Usnadze, Ein experimenteller Beitrag zum Problem der psychologischen Grundlagen der Namengebung, *Psychol. Forsch.*, 5, 1924, 24-43.

figure was exposed for 5 sec., the *O* having the task of discovering the most suitable name for it from a list of meaningless sound-complexes. The *O*s, numbering 10 in all, were also asked to report their experiences. Usnadze does not indicate the number of sound-complexes presented with each figure; 42 sound-complexes were used in all.

The reports of Usnadze's *O*s indicate that the selected word is not applied arbitrarily to the object, one or more of certain particular factors being involved. Of these factors 4 may be distinguished.

(a) *Associative assimilation.* The sound-complex is associated with a familiar word which expresses the significance of the apperceived object.

(b) *Configurative relationship.* *O* experiences an agreement (*Zusammenpassen*) between the perceived form or configuration of the sound-complex and that of the object.

(c) *Affective relationship.* *O* experiences an agreement between the feeling aroused by the figure and that aroused by the word chosen as its name.

(d) *Relationship in mental substructure (Tiefenschichtfaktor).* *O* has, accompanying the perception of the two components, a 'general impression' serving as a basis for the naming-function.

Factors *b*, *c*, and *d* may be called the objective, material or intrinsic (*sachliche*) factors in naming and are thus all set off against the first or associative factor.

Usnadze is convinced that the various factors are not all of equal importance in naming. The associative factor in particular does not seem to be such that it will give the 'right word' with any satisfactory degree of stability. After a "sufficiently long interval," Usnadze re-presented the figures to some of the *O*s and asked them to name the figures as they had done before (*Series A*). If the *O* could not recall the word, he was again shown the list of words and asked to pick out the name which he had selected before (*Series B*). In *Series A*, those complexes which had been chosen on the basis of the associative factor were often retained better than the others, but usually only a part of the sound-complex, or perhaps only the basis for the assimilation, was recalled. In *Series B*, the *O* was often led astray in cases where he had given associative names and now often chose other words as names for the same figures. The results were quite different in the cases in which the intrinsic factors (*b*, *c*, *d*) had been reported. In *Series A*, memory was usually quite unfaithful; in such instances the *O* could not even give individual parts of the names he had previously chosen. In *Series B*, on the other hand, the *O* typically did not 'know' which word he had chosen before (when the word had been chosen on an intrinsic basis) but nevertheless chose the same word the second time in almost all cases. Usnadze concludes from these data and from spontaneous comments by the *O*s that the intrinsic factors have greater importance in founding language than has the associative factor. This conclusion led him to the expectation that the various *O*s would show considerable agreement in the names which they chose for the six figures. As we have indicated, Usnadze used altogether 42 sound-complexes and presumably seven with each of the six figures. Each figure was presented to 8 or 9 *O*s. Of the 42 sound-complexes, only 29 were chosen as names. In the case of the first figure, 45% of the *O*s agreed upon one and the same name; the corresponding percentages for the other figures were 40%, 25%, 40%, 38%, and 40%. "Bei der zufälligen Herstellung und ziemlich grossen Zahl der auswählenden Lautkomplexe ist

also der Prozentsatz der Übereinstimmung der Versuchspersonen beinahe unerwartet gross ausgefallen."<sup>24</sup> Usnadze found further that the associative factor had in only one single case produced an agreement in names; the other cases were distributed almost uniformly among the objective or intrinsic factors.

Usnadze's general conclusion is that the associative factor functions only as a substitutive factor, the others being of greater significance in naming. "Das Wort würde nicht zufällig assoziations- und blinderfahrungsmässig an das beliebige Objekt herantreten und auf diese Weise als Glied zufälliger Verkettung funktionieren, sondern es scheinen bestimmte sachliche Gesetzmässigkeiten entscheidend, denen die menschliche Seele auch auf dem Gebiete der Namengebung folgt."<sup>25</sup>

Usnadze's study is subject to attack on several grounds. (1) He has generalized from far too few cases. It seems certain from his own statements that there could not have been more than 55 (and perhaps as few as 49) observations in the main series. (2) Each *O* observed in so few cases that he was probably quite untrained in this particular field of investigation. (3) Usnadze makes the tacit assumption that the true bases for the selection of names will be indicated in the verbal reports. He does not consider the possibility that the real bases or grounds may lie partly or entirely outside of the level of report, nor does he refer at all to 'rationalized' reports, of which it seems likely there may have been examples. (4) Usnadze's statistical findings hardly authorize the force of certain of his conclusions. His vagueness about the number of sound-complexes presented with each figure, etc., makes a systematic checking of his data impossible. (5) Usnadze reports that the non-associative factors underlay all but one of the agreements in names; but he does not inform us whether the *contents* of the reports made by the several *O*s selecting the same sound-complex show any agreement.

Köhler has recently contended that "there are some similarities between the experiences we have through different sense organs."<sup>26</sup> He refers in a foot-note to Usnadze's study. Köhler has constructed two figures and two nonsense sound-complexes and asserts that any individual will probably be able to decide with ease how the names and figures should be paired."<sup>27</sup> We report below (*Series I*) some group-experiments in which we used Köhler's figures and words. Perhaps motivated by Köhler's discussion, Tsuru and Fries have described a phenomenon which "challenges any behavioristic and associationistic explanation."<sup>28</sup> Twenty-five pairs of English words (*e.g.* large—small) are presented, each pair coupled with a pair of Japanese words having these same meanings. The writers give no detailed results but state that in about 75% of the cases an average subject is able to 'guess' which of the two Japanese words belongs in meaning with the first English word and which with the second. We are offered a provisory explanation rooted in the theory that "meanings, psychologically, are properties of natural organized wholes or processes."

There have recently appeared in this country certain significant studies in which attempts have been made to attack problems suggested by certain particular 'phonetic

<sup>24</sup> *Ibid.*, 42.

<sup>25</sup> *Ibid.*, 42.

<sup>26</sup> W. Köhler, *Gestalt Psychology*, 1929, 242-243.

<sup>27</sup> We have reproduced Köhler's figures and words in Fig. 1.

<sup>28</sup> S. Tsuru and H. S. Fries, A problem in meaning, *J. Gen. Psychol.*, 8, 1933, 281-284.

symbolisms' which appear to be involved in language. Sapir,<sup>29</sup> who initiated this series of investigations, undertook to ascertain "if there tends to be a feeling of the symbolic magnitude value of certain differences in vowels and consonants, regardless of the particular associations due to the presence of these vowels in meaningful words in the language of the speaker." His experiments, which were based essentially upon a method of paired comparison, demonstrate that such 'feelings' are experienced, and that his subjects agree fairly well in their scales of symbolic size.

Newman<sup>30</sup> has carried Sapir's work further, particularly through the use of a statistical method devised by Thurstone.<sup>31</sup> In his first experiments, Newman used 100 pairs of nonsense-words, the two in each pair differing only in their vowels. The words in certain pairs were arbitrarily defined as nouns, others as verbal subjects, others as adjectives, etc. Each of the 606 Os had the task of selecting the 'larger' word in each pair. The vowels used in the words tended to vary fairly consistently in their symbolic magnitude, *i* (as in Fr. *fini*) being the 'smallest' and *o* (as in Fr. *note*) the largest. In his second experiment, Newman studied two particular symbolisms: large *vs.* small, and dark *vs.* bright. He constructed 113 word-pairs contrasting 9 vowels and 15 consonants and presented each contrasting pair of speech-sounds once to each O. The vowel *a* (as in *tall*) appeared to be the 'largest' of those used, and *i* (as in *fit*) the 'smallest.' The 'largest' and 'smallest' of the consonantal sounds employed were *br* and *p* respectively. The orders for the vowels and consonants on a brightness-darkness scale were somewhat different.

To determine whether such phonetic symbolisms as he discovered play an actual part in the English language, Newman made a careful study of the words given in Roget's *Thesaurus* under the rubrics of *greatness*, *smallness*, *size* and *littleness*. He concludes that "the phonetic content of English words takes practically no account of magnitude-symbolism."<sup>32</sup> The implication of Newman's finding stands in sharp contrast to the conclusions of Von Hornbostel and Westermann. Although Newman's statistical refinements increase the cogency of his argument, it should be noted that the German investigators were working particularly with languages less evolved than English, and that thus there may be no basic discrepancy between their data and those of Newman.

In a study undertaken as a check upon the investigations of Sapir and Newman, Bentley and Varon<sup>33</sup> employed four different methods. The results of their first experiment, in which a method of 'free association' was utilized, suggest that "such sounds as we have employed do not *spontaneously* lead to other sounds (under the common conditions of 'free association') which denote or hint at spatial magnitude or its qualifications."<sup>34</sup> In the second method, the experimenter read a nonsense-syllable, the O being instructed to indicate the degree to which it represented some category (*size*, *angularity*, *foolishness*, etc.) or its opposite. In 450 of the 1,500

<sup>29</sup> E. Sapir, A study in phonetic symbolism, *J. Exper. Psychol.*, 12, 1929, 225-239.

<sup>30</sup> S. S. Newman, Further experiments in phonetic symbolism, this JOURNAL, 45, 1933, 53-75.

<sup>31</sup> Cf. L. L. Thurstone, A law of comparative judgment, *Psychol. Rev.*, 34, 1927, 273-286; An experimental study of nationality preferences, *J. Gen. Psychol.*, 1, 1928, 405-425.

<sup>32</sup> Newman, *op. cit.*, 74.

<sup>33</sup> M. Bentley and E. Varon, An accessory study of "phonetic symbolism," this JOURNAL, 45, 1933, 76-86.

<sup>34</sup> *Ibid.*, 78.

reports, the *O*s mentioned some sort of relationship between the category-word and the non-linguistic sound. In the third method, five categories (*foolish, angular, liquid, large, strong*) were employed. The non-linguistic sounds were presented in pairs, the *O* being instructed to report which (if either) of these sounds more closely approximated the meaning of the category. In the 300 pairs of sounds used, there was some relation to the category 165 times. There were, however, only 7 cases of very marked relationship between sound and category. Comments by all the *O*s seemed to bear out the suspicion that the relation was usually forced rather than spontaneous. The fourth experiment was a group-experiment with 26 *O*s. Two non-linguistic sounds, one containing an *a*-sound and the other an *i*-sound but otherwise identical, were given an arbitrary meaning, such as *table*, and the *O*s were instructed to report which of these two sounds represented, say, a larger table. It was discovered that *a*-sounds were larger than *i*-sounds, with an approximate ratio of 4:1. *A*-sounds likewise tended to be 'rounder' and 'softer' than *i*-sounds, although the correlations were imperfect. The writers emphasize the point that these positive reports appeared only when some degree in a scale was suggested and prescribed.

The general conclusion reached by Bentley and Varon is that "certain tonal, vocalic, and consonantal characteristics, which likewise bear a fixed relation to physical sources of sound and also to the human productive mechanisms . . . are so well graduated as to be usable when forced by artifice into the representation of size and of various other concepts and categories as well. Nevertheless, there seems to be insufficient evidence that these graded attributes of sound carry in their own right (so to say) a symbolic reference."<sup>35</sup> Supplementary experiments showed that untrained *O*s were able to distinguish differences in largeness, softness, lightness, etc., not only between pairs of articulated nonsense-sounds but also between pairs of tones and noises, with nothing like symbolic reference being involved.

#### THE EXPERIMENTS

By the use of methods patterned primarily after Usnadze's, we attempted to face once more the question whether there is an intrinsic connection between an object and a name selected for it. The phrase 'intrinsic connection' is, however, so ambiguous that we must make a few important distinctions. To say that there is such a relationship between an object and its name may mean (1) that there is an ultimate ontological connection between the two; (2) that different individuals tend to agree upon one word or sound-complex as the best name for the object; (3) that one individual tends to select at different times the same name for the object; (4) that the connection is unlearned or is independent of the particular specific training of the individual; (5) that there is an experienced interconnection or relationship between object and name; (6) that the individual is able to find 'reasons' for the suitability of a particular name for the object; (7) that there are real objective bases determining the choice of the particular name for the object. Whether or not there may be in-

<sup>35</sup> *Ibid.*, 85.



trinsic connections of the first sort cannot be determined by scientific methods, for the question is essentially philosophical. The fourth meaning of 'intrinsic connection' also lies outside of our present study, not because it is in principle inaccessible to experimentation, but because we have used as observers only English-speaking adults. Similar studies with children and with individuals of diverse linguistic heritages would be practicable and enlightening. We are left, then, with five major questions: (1) Do different individuals tend to agree upon the same word as the most appropriate name for a given object? (2) Is there a relatively stable relationship between name and object, in the sense than an *O* will, at different times, tend to select the same word as the name for the object? (3) Do *O*s experience non-arbitrary relationships between object and name? (4) Do *O*s tend to find reasons contributing to the suitability of the selected name? (5) Are there real objective bases, possibly unreported or even unreportable, which determine the choice of one sound-complex rather than another as the best name for a given object?

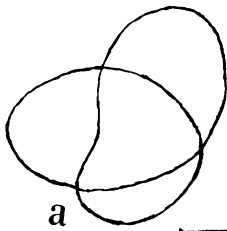
In most of the series we have used only 5 *O*s, all of whom have had some psychological training, and have required full verbal commentaries. Since we have not, except in Series I, resorted to the method of group-experimentation, our observations are fewer in number than those in, say, Newman's investigation. We have, on the other hand, been able to collect data much more extensive than Usnadze's.

One point in our general method demands some consideration: the fact that the words were presented visually. It might appear preferable for the words to be presented to the ear rather than to the eye, but several counter-arguments may be raised. (a) Usnadze's experiments, which we were attempting to check, involved visual presentation of the words. (b) When the words are presented visually, there is a greater possibility of survey and comparison by the *O*s. (c) A somewhat shorter exposition-time may be used with words presented visually. (d) There are fewer difficulties and complications of a purely technical sort in the visual presentation. (e) It may also be said that basically a word is a visual-auditory-kinaesthetic complex, and that it tends to retain a certain invariance or constancy regardless of the sensory avenue through which it is apprehended.

#### SERIES A

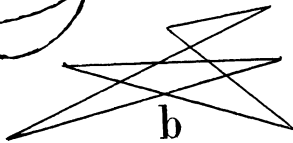
Our problem in the initial series of experiments was to study the procedure by which an *O* selects a name for a nonsense-object from a series of nonsense sound-complexes when he is instructed that later he will be called upon to recall the name.

*Procedure.* We made 14 nonsense-drawings, each consisting of 4 strokes of the pen; a 'stroke' was either a straight line, an arc of a circle, or a complete circle. The drawings were made as distinctive as possible. We also constructed 84 nonsense-words as follows: 28 consisted of two consonants with a vowel between them, *e.g.* *teb*; 28 of three consonants and two vowels, the consonants and vowels appearing

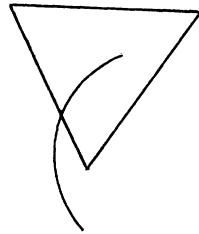


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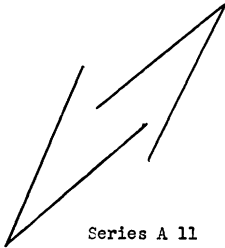
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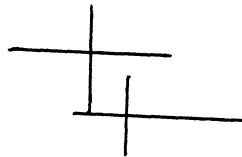
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quar  
vuwol

Series B 21



dajiquil  
yev  
calaheg  
rogut  
nom  
lenav

Series B 41



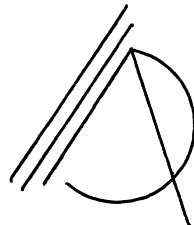
nimep  
kosumop  
zitix  
ouk  
gak  
lavikub

Series B 69



gakomok  
rillilin  
maxob

Series F Er 11



gakomok  
rillilin  
maxob

Series H Er 11

FIG. 1. EXAMPLES OF WORDS AND FIGURES

alternately, e.g. *wenup*; and 28 of four consonants of four consonants and three vowels, the consonants and vowels appearing alternately, e.g. *sidakob*. In forming these words,<sup>36</sup> we used all the letters of the English alphabet; the 21 consonants were used with as equal frequency as possible, and likewise the 5 vowels. We always inserted a *u* after each *q* and never used *q* in the terminal position. With a few other slight reservations, the words were constructed in a purely haphazard manner. Each figure was drawn in black India ink on a white card 5 x 8 in. and at its right side 6 words (two of each of the three types, arranged in random order) were typewritten in a vertical column. An example of a figure and its appertaining words is given in Fig. 1.

The *O* sat in a low chair facing a vertical gray screen (28 x 22 in.) in the center of which was an opening behind which the card was placed. A simple system of metal slides controlled by electro-magnets was used to govern the length of the exposition-time (10 sec.). The cards, which were semi-translucent, were illuminated from behind the exposure-apparatus by a 50-watt electric bulb in a reflector.

The 5 *O*s<sup>37</sup> were given some preliminary practice in pronouncing words similar in construction to those used in the experiment. They were instructed to pronounce the vowels as follows: *a* as in *father*; *e* as in *they*; *i* as in *machine*; *o* as in *pole*; and *u* like the *oo* in *food*. The consonants *c* and *g* were to be pronounced as in *cat* and *dog* respectively. The other sounds were to be given their ordinary English pronunciations. The *O*s were instructed further that the first syllable of each word was to be accented. The *O*s followed surprisingly well these instructions regarding pronunciation.<sup>38</sup>

At the beginning of each observation-period, *O* was given the following main set of instructions:

After the signal 'Ready—now,' a visual figure and 6 nonsense-words will be exposed for 10 sec. Find that one word among the 6 which best fits the figure or is the best name for it. After the end of the exposure, report first the word you have chosen and then give as full a commentary as possible about the entire experience. Later you will be asked to recall the name when the figure is presented alone.

*E* used a stop-watch to control the exposition-time; more exact regulation seemed entirely unnecessary. The *O*s were able to give their verbal reports fairly rapidly, since *E* recorded them in shorthand.

Each *O* named 7 of the figures in each experimental hour. After each such sub-series, *O* was given a rest-period of 5 min.; this interval was spent in general conversation. Then he was given these instructions:

At the signal 'Ready—now,' I shall expose for 5 sec. a figure which you have already seen today. After the exposure report a name for the figure—either the one you selected before if possible, or if not a nonsense-word which would fit the figure.

<sup>36</sup> For the sake of brevity, we shall often speak of 'words' in contexts where 'nonsense sound-complexes' would be the more exact term.

<sup>37</sup> In this and most of the other series the *O*s were Mr. A. Douglas Glanville (*Gl*), Mr. Merrill F. Roff (*Ro*), Miss Charlotte A. Stewart (*St*), Miss Eleanor Lowenstein (*Lo*), and Miss Margaret B. Erb (*Er*). *Gl* was an assistant in the Department of Psychology and had had extensive training and practice in psychological observation. *Ro*, who was an assistant in the Department, and *St*, *Er* and *Lo*, who were graduate students, had all had some training in observation.

<sup>38</sup> There was a slight tendency for some of the vowels to be shortened, e.g. for *i* to approach the *i* in *fit* or *u* to approach the *u* in *pull*.

The figures were then exposed, in random order, for 5 sec. each, the typewritten words on the cards being covered.

*Results.* In the very first part of the experiment, 4 of the 5 *O*s (all except *G1*) were somewhat confused by the instructions and found little meaning in the problem confronting them.

"It's all very vague. There doesn't seem to be any method of telling which word should belong with that figure. It is simply a matter of picking out one of the words, one easier to remember" (*Er* 1).

Very shortly, however, all the *O*s recovered from this initial confusion.

The *O*s tended to emphasize in their reports their 'reasons' for having chosen the particular names. The 'reasons' fall quite easily and naturally into the following classes:

(1) The figure is assimilated to some familiar object whose name might well be a familiar word suggested by one of the nonsense-words. This nonsense-word then becomes the name for the object. This type of 'reason' may be identified with Usnadze's 'associative assimilation.'

"The figure might be taken roughly as a honey-comb, which is similar in sound to *bonaxov*" (*Ro* 3). "The word *kiwagam* and the figure suggested *wigwam*" (*Lo* 4).

(2) The figure and one of the words are apprehended as having a particular common characteristic, e.g. complexity, angularity, or smoothness. In these cases, there is no appeal to associations with familiar objects or familiar words. The naming is reported as not depending upon *O*'s linguistic resources, and is in that sense more immediate than naming of the first type.

"I wanted something to represent the angles; the last two syllables represented the straight lines. It (*yobimax*) was better than the others" (*Lo* 3). "The figure itself aroused pronounced but rather vague empathic feelings which had something sharp about them and at the same time forces pulling in opposite directions. Before I had got completely through the list of words once, I felt that *mizif* was going to be the most satisfactory one there" (*G1* 11).

(3) The *O* reports that the word chosen is a satisfactory name but can give no reasons. This is equivalent to Usnadze's factor of 'general impression.'

"Immediately I felt that *fezipap* was the most satisfactory one, but I found it impossible to give any reason for that choice" (*G1* 8).

These three main types of report are in close agreement with three of the types distinguished by Usnadze. We found, in our 70 reports, no cases of purely 'emotional' or 'affective' fitting, although a few of the reports falling in the other groups indicated affective coloring. Many of the reports indicated that the *O* had either made no real choice of a name or had relied upon characteristics of the word having nothing to do with the problem, e.g. position of the word in the list, pleasantness of the word in its own right, familiarity of the word (quite apart from associations connecting it with the figure). These negative cases are important and numerous enough, in this and other series, to be distinguished as a fourth main group.

"My choice of *rux* was dictated partly by brevity and consequent ease and familiarity, partly by its position toward the end of the list, partly by the fact that I liked the sound of it . . ." (*Ro* 1). "There is no connection. None seems applicable" (*St* 13).

Of the 70 reports, 24 fell in the *associative* group; 20 in the group characterized by a matching of certain aspects or attributes of sound-complex and figure (*at-*

*tributive* group); 4 in the group characterized by unrationalized *general impression*; and 22 in the *negative* group in which there was no real choice, in any strict sense.

To indicate the extent of agreement between the *O*s in their choices of names, we introduce some simple and convenient symbols. The symbol  $A^5$  will be used to refer to cases in which all 5 *O*s agree upon the same name for the given figure;  $A^3B^2$ , to cases in which 3 *O*s choose one word, the other 2 a second word; ABCDE, to cases in which all the *O*s choose different words; etc. In the first column of Table II are listed the various possible patterns of agreement and in the fourth the number of cases (out of 14) falling under each. An examination of the table reveals what at first glance might appear to be a striking agreement between the *O*s, e.g. in only one case out of the 14 did all the *O*s disagree. There were, however, no cases in which all 5 *O*s picked the same word. The data in this series are insufficient for statistical treatment, but for the sake of completeness we

TABLE II  
AGREEMENTS AMONG *O*S IN SERIES A

Pattern of agreement	A priori probability	Expected frequency	Empirical frequency
$A^5$	0.00077	0.01	0
$A^4B$	0.01929	0.27	1
$A^3B^2$	0.03858	0.54	1
$A^3BC$	0.15432	2.16	1
$A^2B^2C$	0.23148	3.24	7
$A^2BCD$	0.46296	6.48	3
ABCDE	0.09259	1.30	1

have presented in the second column the theoretical or *a priori* probabilities of the occurrences of such events simply according to chance. These probabilities are easily determined by elementary principles.<sup>39</sup> In the third column we give the theoretical expected frequencies for 14 cases. Taken altogether, the data would suggest that the *O*s agree slightly more than chance would permit. We cannot conclude, of course, that the agreements are due entirely to factors intrinsic to the problem; purely adventitious factors may, and probably did, play some part. There was, for example, a much stronger tendency for the *O*s to select the first word in each list than any other; sometimes the *O*s reported position as the basis for 'choice' but more often they did not. There was also a greater tendency for the *O*s to select polysyllabic than monosyllabic words. This tendency is probably not a purely extraneous factor, since most of the figures were fairly complicated and, as some reports indicated, long words appeared, for that reason, to be more appropriate.

In summarizing the result of the recall-series, we may distinguish correct recalls (cases in which the *O* gave the word he had chosen in the original series), incorrect recalls (in which the *O* gave a word quite different from his original word), and semicorrect recalls (in which the word reported by the *O* contained half or more of the letters of the word originally chosen and in the same order).<sup>40</sup> The individual dif-

<sup>39</sup> For ease of analysis, we may think of 6-sided dice instead of cards with 6 words, and of five dice instead of 5 *O*s, and ask such questions as this: "What is the probability of getting the same number 5 times in throwing 5 dice?"

<sup>40</sup> Cf. Fischer, *op. cit.*, 342.

ferences between the *O*s were great; *Ro*, for example gave only one correct recall and 2 semi-correct recalls, and *St* gave 10 correct recalls, 4 semi-correct recalls and no incorrect recalls. A consideration of the results from all the *O*s shows that in cases where the reported bases for naming in the original series were associative, 10 of the 24 recalls were correct, 11 semi-correct, and 3 incorrect. In the 20 cases in which the original reported basis was attributive, there were 4 correct, 5 semi-correct, and 11 incorrect recalls. The 4 cases based, according to the reports, upon general impression produced 1 correct recall, 1 semi-correct recall, and 2 incorrect recalls. In the 22 'negative' cases, 5 recalls were correct, 1 semi-correct, and 16 incorrect. The percentage of correct recalls, and likewise of semi-correct recalls, was much larger in the associative group than in any other. Usnadze found in these cases a large number of what we have termed 'semi-correct recalls,' but did not, apparently, find as many examples of correct recall as we have.

We soon discontinued the method used in this series, since the instructions tended to make the *O* select the word which would be most easily remembered rather than the word which would be the best name for the object.

### SERIES B

The second series of experiments were undertaken in order to escape the complications of memory which we noted above.

*Procedure.* We prepared, in accordance with the principles used in Series A, 100 cards each containing one nonsense-drawing and 6 nonsense-words.<sup>41</sup> The general procedure was the same as in the preceding series. The last sentence of the instruction, however, was omitted, and the *O*s were assured positively that there would be no recall-series similar to those in the earlier experiment.

*Results.* The *O*s' reports revealed at once two important facts. In the first place, the *O*s were able, in the great majority of cases, to select a name which was definitely better than the others. Secondly, the reports were often extraordinarily long and complex; only in rare cases was the *O* able to characterize his experience briefly and simply. The following report is typical:

"The figure amazed me. This amazement was due to the regularity of the figure. I sat here for some time staring at the figure and wondering what it all meant. I repeated to myself several times, 'There's a right-angled triangle with those two concentric arcs within it. What does it all mean?' I turned to the list of words without the slightest idea of what sort of word I was looking for. In other words, there was no dominant feature or characteristic of the figure which I expected to be expressed by some of the words. I went through the list of words again and again without finding any one word that was appropriate to the figure. Finally, I hesitated over the word which I gave you (*buzobud*) and for some reason or other I tried to find in that one word something which would characterize the figure. I found nothing of the sort,

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<sup>41</sup> Three samples are given in Fig. 1.

however, and my only reason for giving this word is that it appealed to me a bit more than any other word there" (*Gl* 25).

This example, and many others which we might give, show most clearly that the total naming-process, under our conditions, is far from a simple and logical procedure. If we are to trust the reports, the process does not usually take a straight uninterrupted course, but involves many changes of direction. Self-instructions of the most diverse forms appear to redirect the search for the best name; there is much verbal comment, and imaginal resources of various kinds are drawn into service.

The bases or reasons for choosing the names were reported to be of many different forms, but may be conveniently classified as follows:

(A) *Associative bases*. In this type of naming, the *O* reports that he has relied upon his linguistic resources or upon his knowledge of familiar objects or upon both. Various sub-forms may be distinguished.

(1) The nonsense sound-complex may suggest a familiar word which suits the figure or a part or aspect of it.

"The *peg* at the end of the word (*wopeg*) seemed to fit the straight vertical line" (*Er* 3). "It sounds like *jagged* (*jegid*). It was a kind of jagged drawing" (*Lo* 10).

(2) The figure may be given a meaning which suggests an English word; then a sound-complex which resembles this word or a word related in meaning is selected as the name for the figure.

"The figure could be taken as a human face. I looked for something relevant to humans in the words. The *jim* was sufficiently suggestive of a diminutive name, so that I fairly definitely selected the word (*jimex*)" (*Ro* 25). "Because it looked like a door; the nearest thing to a door was a sill; and the nearest thing to sill was *silafol*" (*St* 5).

(3) The sound-complex falls into the context of a particular language or group of languages.

"The word (*quox*) suggested a Latin word, not any particular Latin word, but just something Latin, while the figure might have been a Roman numeral written in a hurry" (*Er* 47). "It seemed to me that it was possible that *zicomez* might be the name which the Indians might give to such a design" (*Gl* 20).

(B) *Attributive bases*. In these cases, the word and the figure are apprehended as being alike or even identical in certain perceptual respects. This form of matching is similar to, but broader than, Usnadze's configurative relationship.

(1) In a first sub-form, the matching is in terms of formal properties of figure and word.

"Had something of the desired roundness about it" (*Gl* 33). "The rather sharp vowel-sounds of the word (*niken*) harmonized with the two sharp angles of the figure" (*Gl* 51). "I selected *pelakak* because the syllables seemed to be square and discrete" (*St* 79).

(2) Sometimes the fitting is in terms of other properties which can hardly be called configurational or formal.

"The one which I selected (*ropiquov*) had a frivolous sound . . ." (*Gl* 11). "The word (*jicum*) seemed a combination of hard and soft, and the figure gave me that impression too" (*Er* 14).

(3) The *appearance* of the typewritten word may fit the appearance of the figure. This form of matching is a by-product of our method, resting as it does upon visual perception of the word-pattern. Few cases fell within this sub-group.

"The z's looked like straight lines and angles" (*Er* 13).

(C) *General impression.* The *O* relies upon a general impression and there is no thorough attempt to rationalize or explain the interconnection.

(1) Such a connection may be in terms of 'feeling.'

"Immediately the first one (*rowuv*) seemed appropriate, because the sound of it seemed to fit the feeling which I got from the circular, round aspect or characteristic of the figure. Then, however, I said to myself, 'I must look at the other words, because some one of them may be more appropriate. None of them would do, however, and so I sat back feeling very pleased at the first choice I had made. As the exposure ended I was engaged in trying to find reasons why that particular word fitted the figure so well, but I found nothing more definite than I have mentioned' (*Gl* 1). "I just had a feeling this was better. I had no reason for it" (*Lo* 43).

*Gl* sometimes appealed to empathy and kinaesthesia.

"The meaning of either figure or word was not definitely formulated, but the two went together empathically very well. . . . I found it extremely difficult to get any further behind this emphatic belonging-togetherness of figure and word" (*Gl* 54). "There was something about the word . . . which made it seem appropriate in a very vague and ill-defined way. This feeling of the appropriateness of the word to the figure is something I find entirely impossible to put into verbal terms. The nearest I can approach it is to say the sound and kinaesthetic feel of the word which I got when I pronounced it to myself several times tended to harmonize with the feel which I had for the figure. I hesitate to say that this feel for the figure was kinaesthetic, because it wasn't given to me at the time as such. It was vague and diffuse, so that it would be unfair to state that I had it in terms of anything so definitely articulated as kinaesthesia" (*Gl* 5).

(2) Sometimes no 'feelings' are mentioned. It is difficult to distinguish between this and the preceding sub-group, their difference being one of degree of emphasis rather than of kind; sometimes the difference is simply a matter of terminology.

"The word (*moπas*) seemed, for some reason I couldn't understand, to fit the figure" (*Er* 72). "I had accepted it as being an appropriate name, and I now was unable to go beyond that, any more than I can say why *hourse* is the name for the object we so designate" (*Gl* 34). "As soon as I saw the word, I was immediately prejudiced in its favor" (*Lo* 41). "I returned to *rohom* and decided upon it. I don't know why . . . I do not understand the connection" (*St* 96).

(D) *Negative cases.* This group seems necessary for the disposal of cases in which a word is reported, in accordance with the instructions, but the *O* can discover no real reasons for making that choice and furthermore is not at all satisfied with the word.

"I felt that I had selected a word which was utterly incongruous to the figure" (*Gl* 13). "I chose that word merely because I happened to be looking at it" (*Lo* 77). "I selected *raral* because it seemed as good as any" (*Ro* 54).

(E) *Partial bases.* Here the *O* is partly, but not entirely, satisfied with his choice. Cases in this group fall between those in Group D on the one hand and those in Groups A-C on the other.

"There was something about it which fitted the figure slightly. . . . I feel unsatisfied with my choice" (*Gl* 3). "It (*pukapik*) is good for describing a criss-cross of forces; but it's not quite forceful enough" (*Lo* 78).

In Table IV we have listed the number of reports falling under each heading and also the number of each type of report given by each of the *O*s. As the table shows, the *O*s differed a great deal in the frequency of various types of report.



If, in accordance with Usnadze, we combine the 'general impressions' and 'attributive' selections into an 'intrinsic' or 'objective' group, it is striking that *Lo* and *Gl* gave many more reports of such a type than did *Ro* and *St*, and that *Ro* and *St* gave many more associative reports than did *Gl* and *Lo*. *Er* fell between the two groups of *Os* in both respects. These extreme differences are probably due in large measure to the fact that *Gl* and *Lo* had, just before our experiments, been *Os* for Bentley and Varon. As a result of their participation in this earlier experiment, *Gl* and *Lo* were undoubtedly working under an *Einstellung* favoring 'general impression,' or, more particularly, 'attributive' criteria.

Certain incidental observations, especially by *Gl* and *Lo*, whose reports tended to be fuller than those of the other *Os*, are of great interest. *Gl* commented very frequently that the reasons which he had given in his reports were results of rationalization.

"Then I found I didn't know why that particular word fitted it so well. I set about trying to find reasons for my choice" (*Gl* 5). "I could make up reasons, but I really had no reasons" (*Lo* 11). "I went back and tried to build up a case for *pelakak*. It was very easy" (*Lo* 79).

Nothing in the reports given by the other *Os* contradicts the possibility that many of the reported reasons are reasons discovered or elaborated *after* the choice of the name. *Gl* was, almost from the beginning, fully cognizant of the distinction between real reasons and others, but was very often unable to make clear distinctions between them in particular reports. This general tendency toward rationalization, toward enrichment of a possibly already existing interconnection between figure and name, has, as we shall see, important implications.

TABLE III  
AGREEMENTS AMONG *Os* IN SERIES B

Pattern of agreement	A priori probability	Expected frequency	Empirical frequency
A <sup>5</sup>	0.00077	0.08	0
A <sup>4</sup> B	0.01929	1.93	9
A <sup>3</sup> B <sup>2</sup>	0.03858	3.86	6
A <sup>3</sup> BC	0.15432	15.43	19
A <sup>2</sup> B <sup>2</sup> C	0.23148	23.15	26
A <sup>2</sup> BCD	0.46296	46.30	34
ABCDE	0.09259	9.26	6

In Table III are listed the various possible types of agreement between the *Os*, the a priori probabilities of their occurrence, the expected frequency of each in 100 trials, and the actual empirical frequencies found in this experiment. In this particular series, as well as in Series A, there was an obvious source of error which makes it impossible for us to draw the tempting inference suggested by the table and which would make a further statistical analysis of these results misleading. We found, after the series had been concluded, that the *Os* had tended to select words occupying certain favored spatial positions on the cards. Each *O* selected, on the average, 22.6 words in the first (top) position, 17.2 in the second, 19.8 in the third, 14.0 in the fourth, 10.8 in the fifth, and 15.6 in the sixth (lowest) position. A 'space-error' thus presumably played a considerable part in determining the agreements in this series; we were able to show in later series, however, that this spatial factor is neither the essential nor the sole factor

underlying agreements such as those we have found here. The 'space-error' is interesting in another connection, in that it shows how a purely irrelevant criterion, such as spatial position, may be a real determinant of selection, especially if, as here, as many as five or six words are presented with each figure for a short period of time.

We have considered independently the verbal reports of the *Os* and the extent of agreement between them in their choices of names. It is now pertinent to ask to what extent there is agreement in the *contents* of the reports given by several *Os* in cases where they have selected the same name. We shall consider here only the 34 cases in which 3 or 4 *Os* agreed upon one and the same name. Among the 9 cases of agreement by 4 *Os*, there was not a single case in which either 4 or even 3 of the *Os* agreed in the 'reasons' for their choices. In three cases, 2 *Os* agreed upon reasons, e.g., *St* and *Er* both reported associations of *peacock* with *pegok* (no. 26). Turning to the 25 cases of agreement upon the same name by 3 *Os*, we note that in one, and only one, case did all 3 *Os* agree upon a 'reason'; *Gl*, *Er*, and *Lo* reported *zitix* to be a good name for 'crosses' (no. 69). In six of these 25 cases, 2 of the 3 *Os* agreed more or less upon their reasons.

An example of the sort of disagreement typical of the other cases follows: *St* reported an association of *jonquil* with *dajiquil*; *Lo* was "immediately prejudiced" in favor of the word; *Ro* reported that the word was similar to the name of an Indian tribe and that the figure suggested arrows; *Er* found the word "as good as any" (no. 41).

Of the 10 positive agreements in 'reasons,' 4 are clearly agreements upon an associative criterion and one may be considered as possibly associative. Only the remaining cases can be considered as being in any sense agreements upon intrinsic bases; and of these probably not more than 2 or 3 are entirely convincing. These results are decidedly contrary to Usnadze's finding that agreements upon a name were produced in all except one case by intrinsic factors.

There is, of course, a logical possibility that choices of the same name by different *Os* are really determined by different factors, but the nature of our material and method was such that this possibility may be disregarded. We are consequently left with the implication that the *real bases* for selection of names are not, in general, revealed in the *Os*' reports. We cannot with any high degree of reliability determine from one report the real 'cause' for the selection of the name.

#### SERIES C

Series C was undertaken to determine to what extent the *Os* tend to select the same names as before when material which has been used pre-

viously is reëxposed. It was performed about 2 mo. after Series A, Series B having been completed during this interval.

*Procedure.* The *O*s were the same as those in Series A; and the cards used for reëxposure were those which had been used in Series A, but they were now presented in different order. The instructions were:

"After the signal 'Ready—now,' I shall expose for ten seconds a figure and six nonsense words which you have already seen together. Find the word which you most probably selected before. After the exposure, report the word, a number indicating how sure you are that you have succeeded in refinding the word you gave before, and any comments you can make about the experience."

The *O* was given a card upon which were indicated the numbers to be used for various degrees of certainty: 1 = absolute certainty; 2 = high certainty; 3 = moderate certainty; 4 = slight certainty; 5 = complete uncertainty (nothing more than a guess).

*Results.* Since this series was very brief (70 observations) we shall not undertake a detailed analysis of the results. The average number of correct reproductions (*i.e.* reproductions of words already chosen in Series A) was 9.4 out of the 14 for each *O*. Words which had been selected in the first series upon associative bases were given again in this series in 70.8% of the 24 cases; those selected upon attributive bases, in 75.0% of the 4 cases; and those selected by irrelevant criteria or those reported in Series A to be inadequate (negative cases) in 54.5% of the 22 cases. Usnadze found that words which had been selected on the basis of intrinsic criteria were chosen again in the second series "fast in allen Fällen" and that in cases falling in the associative group the *O* was in the second series "sehr häufig irreführt." Our data offer no marked confirmation of Usnadze's statements.

From the degrees of certainty reported by the *O*s we can draw certain generalizations, if we make the assumption that the 5 degrees of certainty are equidistant for statistical purposes. The mean certainty of the *O*s in cases in which the correct word was reproduced was 2.94 (certainty somewhat better than moderate); in cases in which the correct word was not given in Series C, 4.11 (very slight certainty). This calls for no comment. If we classify all the cases in 8 groups in terms of (a) correctness or incorrectness of reproduction in Series C, and (b) basis reported in Series A, we find these average certainties: correct associative, 2.18; incorrect associative, 4.29; correct attributive, 3.73; incorrect attributive, 4.00; correct general impression, 3.33; incorrect general impression, 4.00; correct negative, 3.58; and incorrect negative, 4.10. The most outstanding difference among the correct groups is that between the average certainties of correct reproduction of words selected upon associative and of those selected upon attributive bases, the difference being 1.55 units upon the scale of certainties. This difference is changed only very slightly if we combine with the attributive cases those of general impression. This difference might be considered an indirect confirmation of Usnadze's statement that his *O*s typically did not "know" in the second series what word they had chosen in the first series when the basis had been intrinsic. In our 17 correct associative cases, there were 5 reports of absolute certainty and 8 of high certainty; in the 18 correct intrinsic cases, there were no reports of absolute certainty and only two of high certainty.<sup>42</sup>

<sup>42</sup> But see below, pp. 565-66.

## SERIES D

Series D bears the same relationship to Series B as did Series C to Series A.

*Procedure.* The procedure was in general the same as in Series C, except that of course we now used the 100 cards which had been previously used in Series B. The order of the cards within each group of 10 was changed. The series began about 2 weeks after the completion of Series B and about 2 mo. after the beginning of Series B.

*Results.* Since our results in this series are much more numerous (500 observations) than in Series C, we may undertake a more detailed analysis. The *Os'* reports indicate that the selection of the word most probably selected in Series B may depend upon several quite different criteria which sometimes are involved singly and more frequently cooperate in various ways.

(1) O reported that he made his choice in this series simply because the word selected was more familiar than any of the others.

"I choose that word because it was the only one which seemed to be familiar" (*Er* 9+).<sup>43</sup>

In a surprisingly large number of reports, the *Os* mentioned that a particular word seemed to "stand out."

(2) O reported that he recalled the basis for his original choice and thus was able to choose now what seemed to be the correct word.

"I remembered my interpretation of the figure before looking at the words. I read the words over twice before actually realizing that *meg* was there. When I did stop to think about this word, I recalled having chosen it and why" (*St* 7+).

(3) O found the material on the card unfamiliar and was unable to recall his choice; but now, in looking at the card, he found a basis for choosing some particular word, and this in turn made it seem probable that the same word had been chosen in Series B. In many, but not all, of such cases, the *O* made a 'correct' choice, *i.e.*, his original word.

"I don't know whether it was the word I chose before or not, but it was certainly the one I chose now as best fitting the picture" (*Lo* 7+).

In fewer cases, the reproduction was incorrect.

(4) *O* reported that his choice was simply a guess.

"I have no reason for choosing it" (*Lo* 27—).

In many cases the *O* reported a combination of the criteria of familiarity and suitability of the word.

The average number of correct reproductions for each *O* was 56.4 out of the 100. At the end of the series each *O* was asked to guess the number of correct reproductions he had made. These numbers were in every case less than the actual number of correct reproductions, their average (40.0) being 16.4 less than 56.4.

Making the assumption that the 5 degrees of certainty may be considered equidistant for statistical purposes, we found that with every *O* the mean certainty for the correct reproductions was reliably higher than that for the incorrect reproduc-

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<sup>43</sup> The symbol '+' refers to cases in which *O's* choice agrees with his choice in Series B; the symbol '—' indicates lack of such agreement.

TABLE IV  
QUANTITATIVE DATA OF SERIES D

	<i>O</i> <sub>s</sub>					
	<i>Er</i>	<i>Gl</i>	<i>Lo</i>	<i>Ro</i>	<i>St</i>	All
No. correct . . . . .	53	68	48	51	62	282
No. incorrect . . . . .	47	32	52	49	38	218
Av. certainty, cor. repro. . . . .	3.226	2.956	2.917	3.490	3.565	
S. D. . . . .	0.92	1.10	1.34	1.11	1.45	
Av. certainty, incor. repro. . . . .	3.957	4.375	4.308	4.449	4.790	
S. D. . . . .	0.85	0.74	0.89	0.61	0.52	
Diff. between av. cor. and incor. . . . .	0.731	1.419	1.391	0.959	1.225	
S. E. diff. . . . .	0.18	0.16	0.23	0.18	0.20	
Diff. sigma-units . . . . .	4.1	8.9	6.0	5.3	6.1	
Reliability of diff. . . . .	0.999	0.999	0.999	0.999	0.999	
<i>Associative criteria:</i>						
No. cases . . . . .	46	21	6	71	77	221
No. correct . . . . .	21	17	3	40	49	130
Av. certainty, cor. repro. . . . .	2.95	2.47	3.33	3.27	3.29	3.13
<i>Attributive criteria:</i>						
No. cases . . . . .	31	24	37	—	5	97
No. correct . . . . .	20	18	21	—	3	62
Av. certainty, cor. repro. . . . .	3.41	2.89	3.05	—	4.00	3.17
<i>General impression:</i>						
No. cases . . . . .	10	24	13	5	10	62
No. correct . . . . .	5	15	6	1	3	30
Av. certainty, cor. repro. . . . .	3.60	2.60	3.33	3.00	4.33	3.10
<i>Partial bases:</i>						
No. cases . . . . .	—	22	13	—	—	35
No. correct . . . . .	—	12	7	—	—	19
Av. certainty, cor. repro. . . . .	—	3.83	3.00	—	—	3.53
<i>Negative cases:</i>						
No. cases . . . . .	13	9	31	24	8	85
No. correct . . . . .	7	6	11	10	7	41
Av. certainty, cor. repro. . . . .	3.71	4.33	3.00	4.40	4.86	3.98

tions.<sup>44</sup> We should expect this result, and we mention it only because it indicates that this statistical method of dealing with the degrees of certainty is accurate enough to reveal such a significant difference.

We now studied the relationship between the type of report given by *O* in Series B and accuracy of reproduction in Series D. As Table IV indicates, the words originally 'selected' by associative criteria, attributive criteria and general impression—and reproduced correctly in Series D—were reproduced with approximately the same average degree of certainty, the averages being 3.13, 3.17 and 3.10 respectively. The words which did not fit the figure well (partial and negative groups) and which were reproduced correctly in Series D were reproduced with lower degrees of certainty, 3.53 and 3.98 respectively. In this series there appears

<sup>44</sup> See Table IV.

to be no agreement with Usnadze's implication that names selected by intrinsic criteria are reproduced with less certainty than those selected by associative criteria.

There also appears to be no significant difference between the average accuracies of reproduction of words selected upon associative, attributive and general un-rationalized bases. Of the words selected by associative criteria in Series B, 58.8% were reproduced correctly in this series. The corresponding percentages for words chosen by attributive criteria and by general impression are 63.9% and 48.4%, and for these last two groups taken together (Usnadze's intrinsic criteria), 57.9%, which is almost identical with the value for associative criteria (58.8%). Under our conditions, then, the reason given by the *O* for his initial choice has little or nothing to do with the probability that he will later reproduce it correctly; this is at variance with still another generalization made by Usnadze.

### SERIES E

In Series E, we undertook a study of factors involved in inventing, without any essential restrictions, names for nonsense figures.

*Procedure.* We drew upon separate cards 50 nonsense figures, each consisting of 5 strokes, curved or straight or both. The figures were divided arbitrarily into 5 groups of 10 each, a different group being used with each of the 55 *O*s. The instructions were:

"I shall show you a nonsense-figure. Find a nonsense-word which would make a satisfactory name for it or would fit the figure well. Also construct 2 other words which would be bad names for the figure or would not fit it well. In constructing these words try to avoid any associations at all with English words or words in any language you know. That is, consider the words which you construct merely as sound-complexes. Write the 3 words (the good name first) upon the small card. Then give briefly any comments you can about how you were led to give these words. There is no time-limit, but try to work rapidly."

If *O* gave any words having obvious relationship to any familiar words in the English language, he was asked to substitute other words; this situation arose only a very few times. Also, if *O* selected as a 'good' name a word which was in length radically different from the two 'bad' names, he was asked to substitute for the latter two words standing out less from the 'good' name. This precaution was necessary since we intended later to use the figures and words with other *O*s and wished to rule out, as far as possible, any secondary cues which might aid these *O*s in finding the inventor's 'good' word.

*Results.* The *O*s were able to act in accordance with the instructions; this is in itself noteworthy, since the operation exacted of the *O*s was unusual. In Fig. 2, we give an example of a figure and the appertaining words constructed by one *O*; the underlined word is the 'good' name. The *O*s found it much easier, in general, to invent good names than bad names.

"I find it harder to make up words which don't fit the figure than the ones which do" (*Er* 9).

In spite of the instructions, 3 *O*s (*Er*, *Ro*, and *St*) reported the use of associative criteria in a few cases. In most instances, however, the *O*s reported non-associative factors, usually of the sort we have called attributive.

"I immediately got a feeling of movement and my purpose was to analyze the movement into some form that would be described in sound. I decided on the vowels first and then went through the alphabet to find a suitable consonant to begin the

word. I discarded several because they were not sharp enough" (*Lo* 4). "I took as unanalytic attitude as I could to obtain as far as possible a vague total impression, if possible with affective coloring. The figure looked cramped or tortured; it looked repressed, harsh. I selected a word that was harsh-sounding—*gax*. The word didn't come at once but I knew vaguely that I wanted consonants with a hard sound" (*Ro* 3). "The three circles seemed to necessitate a word in which the idea of similar things was brought out, but because of the angle in the figure, the word had to be more than a succession of similar syllables; that was principally the reason the last syllable of the word (*goguzit*) was added" (*Er* 5).

Several reports indicate ambiguity in the figures.

"I found it difficult to find an appropriate sound-combination for this figure, because there were two meanings which I got from it which I could not fit together very well. One meaning was a geometrical one which applied mostly to the arrangement of four straight lines. The other meaning applied to the curved line and was less definite. It was a rather vague empathic or possibly kinaesthetic meaning. Even though this meaning was vague, it was more compelling than the geometrical meaning. I spent some time trying to find a word which would include both of these meanings. But I finally decided it would be necessary to regard the curved line as the dominant part of the figure and to let the rest of the figure serve only as an appendage" (*Gl* 8).

Such ambiguity, which we also found in earlier series, provides one reason for the lack of perfect correlation between figure and name.

#### SERIES F

Our aim in this series was to study the processes involved in constructing nonsense-figures matching or well named by certain assigned nonsense sound-complexes.

*Procedure.* We prepared for each of the 5 *O*s 10 lists of 3 nonsense words, constructed according to principles we have already described. The *O* was instructed as follows:

"I shall show you three nonsense-words, to be pronounced in accordance with the instructions on pronunciation already given. Construct a simple figure for which one of the 3 words presented would be a good or fitting name and for which the other 2 words would be bad, unsuitable names. Try to work rapidly. Avoid associations with words in any language you know, and do not make your drawings reproductions of familiar objects. Consider the words simply as sound-complexes and your drawing simply as a visual pattern."

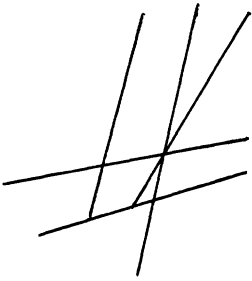
*Results.* Samples of the words and drawings are shown in Figs. 1 and 2. The underlined word in each group is the word used by the *O* as the 'good' name for the figure. Three of the *O*s commented that the task in this series was much easier than that in the preceding series.

"It's much easier to draw pictures for the words than to get words for the pictures. . . . In giving a word one feels that one is committing oneself to something definite, whereas the pictures can be interpreted in so many different ways" (*Lo*). "I had little difficulty; the figure seemed to suggest itself, either immediately or after thinking it over for a short time" (*Er*).

Associative criteria were reported only rarely in this series, the *O* typically reporting intrinsic bases.

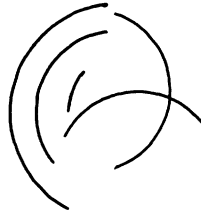
"This (*lis*) was definitely slow and soft. It seemed that this one should be done entirely in curves. It was definitely a soft figure" (*Ro* 12).<sup>45</sup> "It (*sisifit*) suddenly

<sup>45</sup> Numbers from 11 to 20 are used to designate the figures and words of Series F; numbers from 1 to 10 were used to designate those of Series E. Also, 'Ro 12' and 'St 12,' for example, would refer to quite different figures and words.



murari  
petiva  
jixika

Series E G1 7



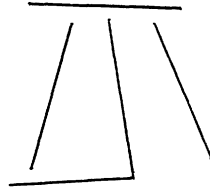
murari  
petiva  
jixika

Series H G1 7



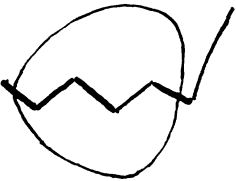
lep  
malal  
puquit

Series F Lo 19



lep  
malal  
puquit

Series H Lo 19



quilat  
manuv  
luribub

Series F Ro 16



quilat  
manuv  
luribub

Series H Ro 16



pasitel  
bohum  
minigib

Series F St 20



pasitel  
bohum  
minigib

Series H St 20

FIG. 2. EXAMPLES OF WORDS AND FIGURES



seemed to me to be a very zigzag word with a drop at the end" (*Lo* 11). "*Malal* has a kind of waving motion" (*Lo* 19).

The most difficult aspect of the problem was for *O* to construct a figure which as a total was well named by the word as a total. All the *O*s commented, from time to time, upon the need for revising certain figures after they had drawn them in order to do justice to certain aspects of the word as a whole which had been neglected.

"The center part represents the sounds of the separate syllables, whereas the outer part was put around it because it (*mebipit*) seemed to have a certain unity" (*Ro* 18). "It looked too diagrammatic, too bare, to suit the word (*piz*) which does sound a bit frivolous, so I added the two short lines at the side" (*St* 13).

### SERIES G

We undertook in Series G a study of the agreements between the inventors' choices of names and figures in Series E and F and the choices made by *O*s who had not previously seen these cards.

*Procedure.* We utilized the figures and words of these two earlier series. The material thus consisted of 100 figures, each combined with three words. We drew the figures and typewrote the words on 5 x 8 in. cards, and exposed them by means of the apparatus used in earlier series. Since each *O* had already named 10 figures and drawn figures for 10 words, there were left 80 cards which he had not yet seen. This present series consisted, accordingly, of 80 observations by each of the 5 *O*s, although in our statistical treatment of the results we have also taken the data of Series E and F into account. The instructions were:

"I shall expose a visual figure and 3 nonsense-words for 6 sec.<sup>46</sup> Find that one word among the 3 which best fits the figure or is the best name for it. Consider the figure as simply a nonsense-pattern and the words as simply nonsense-combinations. After the end of the exposure, report first the word you have chosen, and then give a brief concise commentary about the experience."

*Results.* In accordance with the change of instructions, the attitudes of the *O*s, as reflected in their comments, were generally different from those in Series A and B. There were, in the 400 observations constituting Series G, only 24 reports of associative criteria, while there were 173 reports of attributive criteria and 89 of general impression. The remaining 114 reports, which we may place in a 'doubtful' group, we have not attempted to classify; in many of such cases, *O* reported that the word chosen was not strictly a name for the subject, and in others it was impossible to determine from the report the nature of the criterion involved. *Er*'s shift of attitude is characterized in the following general comment:

"In the very first series (Series A and B), in order to have a word fit a figure I had the idea that they must somehow express the same idea, that of some particular object or something like that. However, now certain syllables and sounds represent certain curves and angles and some combinations express something fairly compact and some of them sort of drawn out" (*Er*).

Some of the typical characterizations of words in this series are as follows:

*Luribub*: rambling, indeterminate; *lixifiz*: straight, long, complex; *muk*: concise, small; *pexizi*: concise, angular; *bul*: curved; *mixik*: hard, angular (by *Er*).

<sup>46</sup> After the first few observations, the exposition-time was lengthened to 8 sec. for *Ro*, since he commented that a period of 6 sec. was too short for him.

*Minip*: lively; *zapin*: voluminous, yet pinched; *vip*: small, concentrated, sharp; *mabir*: curved, dynamic, lively (by *Gl*).

*Zomil*: curved (by *Lo*).

*Labax*: hard; *sbrok*: crisp, sharp; *texali*: not well integrated (by *Ro*).

*Blog*: heavy, square, solid; *bul*: heavy (*b*), smooth and soft (*ul*) (by *St*).

In general, there is very imperfect agreement between the *Os* as regards the 'symbolism' of particular sounds, and even for one and the same *O*, there is not always a perfect consistency in the characterizations reported. *St* was different from the other *Os* in this respect; she alone developed a 'system' of characterizing the sounds. At the end of the series, *St* was asked to describe the 'symbolic value' of the letters of the alphabet, as pronounced in accordance with our instructions. A few examples of her comments about the speech-sounds are as follows:

*a* = "something extended."

*b* = "weight or bigness which meant weight."

*d* = "some heaviness or height, without too much thinness; something that gives height with heaviness at the bottom would be excellent. That is rather more visual than auditory."

*l* = "a long, slightly curving line, or even part of a circle."

*m* = "an arc or a curly line."

*q* = "a short, thin straight line, or an angle."

*s* = "a curlicue, probably visual. *It seems a bit auditory, but I imagine that is rationalization.*"

This elaborate system reported, and fairly consistently utilized by *St*, indicates very clearly the wealth of characteristics which speech-sounds may have. In a few cases the 'symbolism' accrues to the appearance of the written letter rather than to its sound, but in general *St* is inclined to attribute characteristics to the sounds themselves. The sentence which we have italicized above shows that *St* was quite aware of the danger of rationalization.

We found in this series (as in others) that the *Os* agree very little in the reasons which they give for choosing the same words. In 15 of the 100 cases all 5 *Os* agreed upon one and the same word as the best name for the figure. The only agreements in reported bases which can be found among these are as follows: 3 *Os* found angularity or hardness or sharpness in *bexit*; 2 *Os* called *xex* tangled or confused; 2 referred to rotundity or curvedness in characterizing *bul*; 2 called *rakok* harsh or angular or sharp; two spoke of an emphatic harmony between *gajan* and the appertaining figure; 2 reported associations of *tirogon* with the word *polygon*; and for 2 *Os* *rilibin* suggested a series of similar arcs. Otherwise the *Os* disagree concerning their bases for these 15 names or simply do not report reasons. As in other series, we find a correlation far from perfect between word selected and 'reason' for its selection.

In one, and only one, way have we been able to make out systematically on the basis of the *Os*' reports an 'objective' relationship between sounds and their characterizations. An inspection of all the reports of attributive bases revealed that *sharpness* and *angularity* on the one hand, and *roundness*, *smoothness* and *voluminousness* on the other were the terms most often applied to figures and sound-complexes. Logical considerations, supported by some of the reports, permit us to treat these two descriptive groups as opposites. We determined the number of times each letter was characterized as *round*, *smooth*, etc., and as *sharp*, *angular*, etc. If an *O* characterized an entire word in either of these ways, we took into account all the letters in the word; if the *O* specified that only certain particular letters in

the word were so characterized, we counted only these letters. In Table V we give the number of times each letter was characterized in each of the two ways and, in terms of percentage, the relative number of times it was reported as 'sharp,' etc.; these percentages subtracted from 100% would indicate the relative frequencies for 'roundness,' etc. As the table immediately reveals, some of the letters were characterized in the two ways so infrequently that safe inferences about their 'symbolic' value cannot be made; the letter *d*, e.g. was characterized in the two ways only 9 times. There are, on the other hand, many letters which were very often so characterized. If we disregard letters with total frequencies of less than 20, we are left with this rank-order, running from greatest sharpness or angularity to greatest

TABLE V  
RANK-ORDER OF LETTERS IN SHARPNESS AND ROUNDNESS

Letter	No. times characterized as "sharp," etc.	No. times characterized as "round," etc.	Relative frequency of characterization as "sharp," etc.
d	8	1	88.9%
j	13	2	86.7%
x	15	3	83.3%
v	12	3	80.0%
i	65	19	77.4%
z	16	5	76.2%
k	22	7	75.9%
w	3	1	75.0%
f	8	3	72.7%
q(u)	5	2	71.4%
h	4	2	66.7%
p	12	7	63.2%
g	13	10	56.5%
s	9	7	56.3%
t	11	9	55.0%
a	18	27	40.0%
e	13	20	39.4%
c	3	5	37.5%
y	3	5	37.5%
o	10	29	25.6%
n	4	13	23.5%
r	6	20	23.1%
b	5	23	17.9%
u	8	39	17.0%
l	2	42	4.5%
m	1	32	3.0%

roundness, smoothness or voluminousness: *i, z, k, g, t, a, e, o, r, b, u, l, m*. The fact that we have been able to discover such a scale, imperfect as it may be, is significant for two reasons. First, the *O*s were not given any formal instruction to search for these particular 'symbolisms.'<sup>47</sup> Secondly, we have been able to find great differences between the two extremes of the series in spite of the fact that we counted *all* the letters in many of the characterized words. Although undoubtedly many of the particular letters in these words did not fall in with the 'symbolism' reported for

<sup>47</sup> Since both angles and smooth curves were utilized a great deal in the construction of our figures, the performances of the *O*s was probably governed to some extent by a type of instruction arising from the situation itself. Cf. M. Bentley, *The New Field of Psychology*, 1934, 29, 366.

the entire words, there still remains a great difference between the extremes. The scales established by Newman have much greater reliability than ours, but it will be recalled that he was working particularly with contrasts between pairs of sound-complexes whose members differed in *only one* phonetic element.

If causes subsumed under the category of chance were the only effective factors producing agreements between *O*s, we should expect that each *O* in Series G should agree with the inventors (of Series E and F) upon one-third of the names, *i.e.* upon 6.67 names, since there were 3 words upon each card. We find, however, that the *O*s in Series G agreed, on the average, with 9.50 of the 20 words designated as best by the inventors, and in no case were there fewer than 7 agreements.

In Table VI we present the number of cases in which various numbers of *O*s in this series agreed with the inventor. We have added, in the table, the probabilities of occurrence of each of the types of agreement, and the expected number of cases of each. It is immediately noticeable that there is a very marked tendency for the *O*s to agree with the inventor. Through application of the Gram-Charlier series<sup>48</sup> we determined the probability of the occurrence of as many as 15 cases (out of 100) in

TABLE VI  
AGREEMENTS BETWEEN INVENTORS AND OTHER *O*S IN SERIES G

No. <i>O</i> s agreeing with inventor	A priori probability	Expected frequency	Empirical frequency
4	0.0124	1.24	15
3	0.0988	9.88	23
2	0.2963	29.63	18
1	0.3951	39.51	25
0	0.1975	19.75	19

which 4 *O*s agree with the inventor, and also of the occurrence of as many as 23 cases (out of the 100) in which 3 *O*s agreed with the inventor. In each case the probability was so low (less than 0.0001) that the agreements can hardly be attributed to chance. Since the differences indicated in the table are so striking, it seems unnecessary to give a detailed report of our statistical procedure.

Spatial positions of the words upon the cards did not contribute to any significant extent to the agreement of the *O*s. Of the 400 names chosen, 127 were in the first position, 127 in the second, and 146 in the third position on the card. There was, in this series as in others, a greater tendency for the *O*s to choose polysyllabic than monosyllabic words, on the average each *O* selecting 25.1% of the available monosyllabic, 34.5% of the disyllabic, and 40.0% of the trisyllabic words. The results of Series H show, however, that absolute characteristics of the words cannot be the essential determinants of agreements, and also confirm our supposition that, under the conditions of this experiment, the space-error is negligible.

The *O* reported voluntarily in most of the 400 observations constituting this series that the name selected was either 'good' or 'bad' (even though better than the other possibilities). Reports which were at all doubtful we divided equally among the two groups. We may also classify all the reports by another criterion—whether or not the word selected by the *O* in this series is the same as the name

<sup>48</sup> Cf. B. H. Camp, *The Mathematical Part of Elementary Statistics*, 1931, 225 ff.; A. Fisher, *The Mathematical Theory of Probabilities*, 1, 1926, 188 ff.

assigned to the figure by the inventor in Series E or F. Combining the criteria of agreement with inventor and goodness of fit, we may classify all of the 400 reports of the present series in four groups. Of the words which agreed with the inventor's selections, 143 were reported to be good names, 47 to be bad or questionable names. Of the words which did not agree with the inventor's selections, 114 were good names and 86 bad. These results suggest a positive relationship between goodness of fit and agreement with inventor. If the *O* selects an 'incorrect' word, he is about equally likely to find it good or bad. If, on the other hand, he selects a word already assigned to the figure by the inventor, he is very much more likely to call it 'good' than 'bad,' even though he will probably not specify the same reason for selecting it as did the inventor.

### SERIES H

Series H was included in order for us to determine whether or not the agreements between the *Os*' selections of names in earlier series can be attributed primarily to certain absolute characteristics of the sound-complexes themselves, taken in isolation from the figures, or whether the agreements involve real relationships between figures and words.

*Procedure.* In Series G there were 41 cases in which 4 or 5 *Os* selected the same name. In Series H, we retained the 41 sets of 3 nonsense sound-complexes, but instead of using the figures of Series G, we drew new figures, each of which differed as much as possible from the one upon the corresponding card in the earlier series. Round figures were replaced by angular; large by small; relatively complex by relatively simple; symmetrical by asymmetrical; etc. It was usually difficult, if not impossible, to draw a figure which might be regarded as the 'opposite' of the corresponding figure of the earlier series; in many cases, we could do nothing better than produce a figure which was simply unrelated to the earlier one.

The figure and words were exposed as in earlier experiments, and the instructions were essentially the same as before. The *Os* were *Er*, *Lo*, *Ro*, and *St*, all of whom had observed in Series G,<sup>49</sup> and also Dr. R. B. MacLeod (*Ma*) instructor in psychology, and Mr. A. D. Freiberg (*Fr*), graduate student in the department.

The main problem of the series was to determine whether *Os* still tended to pick the same words after the figures had been changed. If such is the case, we must assume that certain absolute characteristics of the words underlie the agreements in such series as Series G. If, on the other hand, the *Os* tend to shift to other words, we should have an indication that the choice made by the *O* depends upon relationship of some sort between figure and word.

Each of the 4 *Os* who had taken part in Series G chose on the average in Series H 13.0 of the 41 words which he himself had chosen in Series G; this is slightly below what we should expect by chance (13.67). We also find that each of the 6 *Os* chose on the average in this series 12.7 of the 41 words which had been selected by either 4 or 5 *Os* in Series G, the expected chance frequency again being 13.67. There is therefore no tendency, so far as can be discovered, for the same words to be named in the two series.

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<sup>49</sup> *Gl*, the remaining *O* of Series G, was unavailable.

We determined the number of times each of the 6 *O*s in this series agreed in his selections with each of the other 5 *O*s in this same series. The expected number of agreements would be, as before,  $41/3$  or 13.67. Every one of the empirical values is larger than this, the smallest being 15, the largest 25. The average number of agreements between pairs of *O*s in this series is 19.3.

Absolute characteristics of the words are evidently insufficient to explain agreements. When figures are changed, names tend to change. It may appear strange that in spite of the change of figures, there is still approximately chance agreement between choices made in Series G and H, for with opposite or contrasting figures we might expect, ideally, *no* agreements. The solution of this difficulty is undoubtedly that between the pairs of figures of the two series there is not so much a relationship of opposition or contrast as a simple lack of relationship; under such conditions we should expect chance agreement between the two series.

### SERIES I

In the earlier series we employed 6 *O*s at the most. In Series I we undertook to study agreements in names selected and reasons reported by a large number of *O*s.

*Procedure.* We utilized as material simply the two figures and two words—*takete* and *baluma*—given by Köhler<sup>80</sup> and shown in Fig. 1, a and b. The *O*s, numbering 78, were members of four classes in elementary psychology. Different procedures were employed with the four groups. In Group I we reproduced upon the blackboard Köhler's two figures and two words. The *O*s were instructed to match the figures and words and to write any relevant comments. *E* pronounced the words aloud, accenting the second syllable of each and giving the vowels the same pronunciations as in the other series. In Group II, Fig. 1a and the two words were reproduced; the *O*s were instructed to select the word better naming the figure and to give their comments. Later Fig. 1b was added and the instructions used in Group I were given. In Group III the procedure was the same, except that Fig. 1b was first used, Fig. 1a being added later. In Group IV, both figures were drawn but at first only the word *takete* was presented, the *O*s being instructed to select the figure better named by this word; later we adopted in this group the procedure used in Group I. The other possible variation in the procedure appeared to be needless.

*Results.* The results were practically the same under all the sets of conditions. All but 4 *O*s named Fig. 1a *baluma* and Fig. 1b *takete*, and 3 of these dissenting choices were made only when one of the words or one of the figures had not been presented. Many *O*s reported associations of *baluma* with such English words as *balloon* and *ball* as their bases for selection,<sup>81</sup> and a very few *O*s reported associations of *takete* with such words as *kite*. Typically, the *O*s reported attributive similarities or identities between figure and sound-complex.

"*Baluma* gives me the sensation of plumpness, a sort of round roly-poly sensation, and therefore I place it with Fig. 1a." "*Takete* seems sharper and therefore would

<sup>80</sup> W. Köhler, *Gestalt Psychology*, 1929, 242-243.

<sup>81</sup> We made supplementary observations in a class of 37 undergraduates, using *malumba* instead of *baluma*. All but one of these *O*s made the expected matches. This indicates that associations with *ball*, *balloon*, etc., are not essential in producing agreements.

apply to a figure having points." "The figure is jagged and *takete* sounds that way."

If we disregard the associative criteria, we find startling agreement among the *Os* even in the words which they used to characterize the word and figure in each pair. The word *round* (including its grammatical variants) was used by no less than 26 *Os* to describe *baluma* and Fig. 1a; smooth and soft were used 16 and 14 times respectively. With the other word-figure pair, *sharp* was used as a descriptive term by 37 *Os* (nearly half of all the *Os*), angular by 9, and even *staccato* by 6.<sup>52</sup>

It seems unquestionable that Köhler selected an extreme example to illustrate his point. The fact that the two words and likewise the two figures are strongly contrastive would tend to exaggerate any tendency toward matching that there might be, an outstanding gradient of sharpness (or roundness) being established. In the case of *baluma*, Von Hornbostel's characterization of the sound *m* seems to be applicable.<sup>53</sup> Furthermore both *takete* and *baluma* are so constructed that they fall nicely into the opposed phonetic classes distinguished by Westermann.<sup>54</sup> The results are also in very close agreement with our own results in Series G, in which we found *m*, *l*, *u*, and *b*, to be the roundest or least sharp speech-sounds; these are precisely the important phonetic elements in *baluma* (when the second syllable is accented). We likewise had found that the outstanding sounds in *takete* were sharper (or less round) than the sounds in the other word, even though these sounds were not at the top of the scale in sharpness.

### SERIES J

About 13 months after the completion of Series G we were fortunate enough to find available 3 (*Gl*, *Ro*, *St*) of the 5 *Os* who had participated in that series. Since presumably these *Os* had 'forgotten' the words and figures of that series after such a long interval, it seemed of interest to determine to what extent these *Os* would agree or disagree with their own earlier selections of names in Series G.

*Procedure.* The procedure was essentially the same as in the earlier series. We presented the same cards, in different order; the *Os* were not informed that an earlier series was being repeated.

*Results.* To dispose immediately of a possible objection to this series, we should say that with a very few exceptions the words and figures appeared quite unfamiliar to the *Os*. *Gl* reported after the completion of the series that he had recalled "three or four" of the 100 words; *Ro* found a few of the "crudely drawn figures" (those of Series F) somewhat familiar, but remembered none of the words and none of the "previous connections" between figures and words.

The expected number of agreements between the choices made by any one *O* in Series G and his choices in this series would be 1/3 of 100, or 33.33, if chance were the only determinant of agreement. *Gl*, however, agreed in 60 of the 100 cases with his original selections, *Ro* in 35 cases, and *St* in 54 cases. The mean number of agreements was thus 49.7. If we neglect the very slight possibility of positive 'recall' by the *Os* of their selections made many months before, we may

<sup>52</sup> The relationship between *takete* and *staccato* is probably associative in part. But, over and above this, the sound of *staccato* is onomatopoeic.

<sup>53</sup> Cf. above, p. 547.

<sup>54</sup> Cf. Table I.

conclude that there are objective factors determining these selections of names objective in the sense that there is a marked tendency for the same *O* to select the same word at different times as the best name for a given figure. We also found that the words selected by the same *O* in *both* series tended to be those which had been selected in Series G by relatively many *O*s. On the average, 3.13 of the 5 *O*s in Series G had selected the words reproduced 'correctly' by *G1* in this series, and only 2.73 *O*s those reproduced 'incorrectly' by the same *O*. The corresponding values for *Ro* were 3.15 and 2.65, and for *St*, 3.59 and 2.57. The reliabilities of these differences, as determined in the customary way through calculation of the standard deviations of the means, were 0.95 (*G1*), 0.94 (*Ro*), and 0.9999 (*St*). If the results of all three *O*s are taken together, the reliability of the difference is greater than 0.9999. The implication is that certain factors which produce agreements *between O*s likewise tend to produce agreement between the selections made by one and the same *O* at different times, and thus are objective in a double sense.

We have already pointed out that the agreements in selections between Series G and H (in which the figures were *different*) were approximately what should be expected by chance, the mean number of agreements being 31.7 out of 100, or 31.7%. The mean number of agreements in the 41 cases falling in both Series H and J was 25.6%, which is somewhat below the chance-value, 33.3%. Both of these empirical values are lower than the mean percentage of agreements between Series G and J (in which the *same* figures were used), which was, as indicated above 49.7%.

We have confirmed in this series our finding in Series H that if the figures are changed, the words selected by the *O*s as names for them tend to change; also we have shown that if the figures are *not* changed, there is marked tendency for *O*s to select the same words as names for the figures, even after an interval as long as 13 months.

#### DISCUSSION OF RESULTS

We have found, as have other investigators, that *O*s agree with each other more markedly than we should expect according to chance when they select one nonsense-word from a list as the best name for a given figure. The results of Series H, in particular, show that these agreements cannot be attributed in general to absolute characteristics of the words alone, and that we must look for bases involving relationship between word and figure.

Earlier investigators, particularly Usnadze, have tacitly assumed that an *O*'s report concerning his experience in choosing a name will reveal the real basis for his choice. Usnadze has classified in four groups the factors underlying naming, without suggesting the possibility that the reported factors are not the real factors. In our own experiments we have been unable, in general, to find a perfect or even a high correlation between actual agreements between *O*s as regards names chosen and the reasons or bases indicated in their reports. All 5 of our *O*s may, as in Series G, agree



upon one word out of three as the best name for a given figure without agreeing in the least upon their bases or reasons for their choice. Here the objection might be raised that the *Os* have a difficult task and that the disagreements between their reported reasons are simply due to omissions or to very imperfect observation. Several considerations aid in disposing of this objection. (1) The *Os*' disagreements in 'reasons' are *positive* disagreements. In some instances, it is true, the *Os* give reports which are simply insufficient, but typically they report positive reasons which disagree from individual to individual. (2) Some of them realized very early in the course of our study that the reasons which they were reporting were simply 'rationalizations,' but were unable in general to draw a strict line between real reasons and such *ex post facto* reasons. (3) There are grounds for believing that 'rationalizations' tend to occur in the full naming-process as contributions to the suitability of the name already selected; the total course of the naming-process, that is, is so closely interwoven that there is a certain artificiality, from the namer's point of view, in dividing the process into distinct stages.

We have found no clear evidence that words 'selected' by intrinsic (*sachliche*) criteria are reproduced more accurately when *O* perceives all the material a second time than are those 'selected' by associative criteria. Our results again conflict with Usnadze's. Unless we assume that his *Os* manifested rare 'insight' into the real grounds for their choices, we must conclude that the discrepancy between our results and his is due primarily to the paucity of his data. We did discover, however, a positive correlation between the number of *Os* who selected a word and the accuracy with which the same word was reproduced when the same *Os* were asked, after a long interval, to find the word chosen before. If high agreement between the *Os* may be traced to certain real bases which are non-associative in nature, the inference would then be that names really selected in terms of such criteria are more likely to be remembered or to be reproduced correctly.

In one respect we were able to determine without difficulty some agreement between real bases and reported bases: certain letters (such as *i*, *z*, and *k*) are more likely to be found in words selected for figures characterized by the *Os* themselves as sharp or angular than in names for round or smooth figures. Other letters (especially *m*, *u*, *l*, and *b*) are more likely to be contained in names for figures characterized as round than in those of the other group. In these cases it would appear that we have certain characteristics of figure and word which are so salient or dominant that they determine not only the actual choice of names but likewise determine the

attributive characterizations reported and possibly elaborated by the observer.

In general, our experiments were not adapted for a detailed study of the real bases underlying naming. The non-correlation between real and reported bases which we discovered so unexpectedly made a systematic study of real bases impossible, except to some extent in the case mentioned just above. Methods such as those of Sapir, Newman, and Bentley and Varon, coupled with studies of the acoustical structure of speech-sounds, are better adapted to the study of the real or objective bases of naming.

According to the most 'obvious' view, the process of selecting a name for an object would be something like this: *O* discovers a word which agrees with the figure in some respect; since there is this agreement, he concludes that the word would be a good name for the object; if he is then asked to report his naming-experience or simply comment to himself, he is able to specify the reasons which led to his choice. According to another view which seems justified and even demanded by our results, the process takes a form such as this: without necessarily knowing 'why' he finds a particular sound-complex has become a name for the object; the word selected is very often announced to him as 'good' or 'bad' or 'mediocre'; he is then able and likely to go on to rationalize the interconnection, either by reading into it certain 'phonetic symbolisms,' by discovering linguistic associations, or both; this enrichment of the relationship between figure and word will then probably be formulated by him as the real basis underlying his choice.

In our study we have unearthed a wealth and variety of attributive characterizations of sound-complexes and have shown that much of this enrichment and elaboration of the naming-function has little or nothing to do with the real basis for the selection of the name. The situation is somewhat the same in actual languages and other codes of symbols. For many persons, the word *cool* not only *means* moderately low temperature but itself *sounds* or even *looks* cool; such words as *melody*, *massive*, *breeze*, and *cloud* likewise often bear such 'physiognomies.' But in none of these cases has the physiognomic coloring of the sound-complex *made* it into a name, for the word has taken on a physiognomy only after it has been accepted as a name. Werner has recently emphasized the significance of such physiognomic aspects of words but has been careful to add that the existence of these in developed languages does not authorize attempts to found a general universal physiognomic system (*Urphysiognomik*) for all languages.<sup>55</sup>

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<sup>55</sup> H. Werner, Über die Sprachphysiognomik als einer neuen Methode der vergleichenden Sprachbetrachtung, *Zsch. f. Psychol.*, 109, 1929, 337-363.

## CONCLUSIONS

(1) Individuals agree better than chance would lead us to expect in choosing names for visual figures from lists of nonsense sound-complexes.

(2) With general instructions, *Os* tend to report as reasons for their choices associations involving their knowledge of languages and of familiar physical objects.

(3) Sometimes, under general instructions, but much more often under instructions discouraging reliance upon linguistic knowledge, the *Os* report that they have based their choice upon certain common attributes or characteristics (*e.g.* sharpness, smoothness) of sound-complex and figure.

(4) More rarely, *O* reports simply a 'general impression,' which may or may not be affectively toned, as his basis for the suitability of the sound-complex as a name for the figure.

(5) In general, the *Os* agree upon the same word in a particular case much more frequently than they agree upon their bases for selecting it. It is therefore essential to distinguish between the real bases underlying the choice of the names and the *Os*' reported 'reasons,' which are often simply rationalizations contributing to the suitability of the name already chosen.

(6) There is no significant relationship between type of basis *reported* and the accuracy with which the word is reproduced at a later time when words and figures are re-presented.

(7) There is a positive relationship between the number of *Os* who have chosen a given word and the accuracy of any one of these *Os* in reproducing the word later. Names which have 'objective determinants' in this sense are thus more likely to be reproduced correctly later.

(8) One scale of attributes (*roundness—sharpness*) is so dominant or salient that the real bases and reported bases tend toward agreement. The sounds of *i*, *z*, *k*, and certain other letters tend to be sharp or angular; those of such letters as *m*, *l*, *u*, and *b*, smooth or voluminous. The *Os* give such characterizations even without any formal instructions suggesting this particular scale of attributes.