THE TEMPORAL RELATIONS OF MEANING AND IMAGERY

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I. THE PROBLEM

The experiments here reported constitute a part of a more extensive study of memory and perception, which will probably be made public in the future. The work was done in the laboratory of Professor Külpe at Munich. The part now published cannot, however, be properly evaluated without some indication of the nature of the results obtained in the first section of the more extensive study. This first part consisted in an introspective investigation of the mental processes involved in perception and recall.

The material for experiment in the unpublished section consisted of spoken words, printed words, printed pictures and real objects. A series of eight words, pictures or objects were presented to the subjects. Their task was to repeat what they had seen or heard and then to give an introspective account of the mental processes they had experienced during the perception of the series and during their attempts to reproduce the same from memory.¹ The subjects were asked particularly to give an account of the temporal sequence of events as they had experienced them.

It was rather remarkable that in perceiving, the first thing in consciousness was reported as meaning the second some kind of imagery. Whereas in repeating the first thing was often an image whose meaning was understood and then designated by a word.

A few introspections will bring out more clearly what is meant by this assertion.

¹ A fuller description of the details of the technique will be given when the entire work is made public.

PERCEPTION OF PRINTED WORDS

"I notice now a certain regularity in this process. With the first word, the meaning appeared with the reading, without any clear visual image of the object thereby designated. The same process takes place on the continuation of the series of words. Gradually it goes on so rapidly that during the period of exposition (2 seconds) there is time to apprehend a goodly number of apperceptive complexes, which become associated with the imaged object. The steps in the process—so far as I can notice them—are:

"1. Apprehension of the meaning.

"2. Imagery of the object—generally by means of memory images.

"3. Associations which are connected with the object."

Subject Lehner, Nov. 17.¹

PERCEPTION OF PICTURES

"I look at the picture and generally have its meaning at once. Often I am not entirely certain, *e. g.*, spoon or trowel. When I have the meaning, its naming follows immediately."—Grüniger, Dec. 17.²

"In the perception of the several pictures, I notice that I experienced auditory-motor words in immediate connection with them, and that these words followed with varying rapidity the individual pictures. It lasted some time till I got the word 'Mitre.' In this experience it appeared to me that the rapidity with which the word comes, does not depend as much upon the finding of the words as it does upon the

¹ Ich merke jetzt eine gewisse Gesetzmässigkeit des Prozesses. Bei dem ersten Wort tritt mit dem Lesen die Bedeutung bewusst auf, ohne deutliches Gesichtsbild des darin fixierten Objektes. Derselbe Vorgang vollzieht sich bei der Fortsetzung der Reihe, allmählich mit so grosser Schnelligkeit dass während der Exponierungszeit noch Zeit bleibt eine ganze Fülle von Apperceptionsmassen bewusst zu erfassen, die sich an das vorgestellte Objekt noch knüpfen. Die Stufen so weit ich sie bemerken kann sind: 1. Erfassung der Bedeutung. 2. Vorstellung des Objektes, gewöhnlich durch Erinnerungsbilder. 3. Associationen die sich an das Objekt knüpfen. (17ten. Nov.)

² Ich sehe das Bild and und meistens habe ich sofort die Bedeutung. Manchmal bin ich nicht ganz sicher z. B. Löffel oder Kelle. Wenn ich die Bedeutung habe, folgt sofort die Benennung.

recognition of the picture. It is on this account that I would willingly have looked longer at the pictures. The words served as designations for the pictures or if you will the objects represented by the pictures, and had another sense, a more general meaning than their relation to the individual pictures or their objects."—Subject Külpe, Nov. 14.¹

REPETITION OF OBJECTS

"On repeating, there comes to me all of a sudden a visual image. When this image comes promptly it is usually complete. But when I must think awhile, there comes to me first of all something striking in the object. Then come further qualities, *e. g.*, to the color the form. As soon as this process of supplementing has developed to a certain point, the meaning is all of a sudden present. As soon as I have the meaning, the object seems to become still clearer. *E. g.*: All of a sudden I see the typical lustre of a pearl. Then there comes to me the round form and then all at once I know what it is."—Subject Grüninger, Dec. 10.²

Were meaning in some manner identical with imagery, or were it produced by imagery or the imaginal context of a sensation as Titchener suggests is often the case, we should expect just such introspections as this from our subjects—not however for memory but for perception. That they are

¹ Ich bemerke dass ich bei der Wahrnehmung der einzelnen Bilder sofort akustisch-motorische Wörter in Anschluss an sie erlebt habe, und dass diese Wörter in verschiedener Geschwindigkeit sich an die einzelnen Bilder anschlossen. Bei dem Wort Bischofsmütze, *z. B.*, dauerte es ziemlich lang bis ich es fang. Dabei schien die Geschwindigkeit des Auftretens der Wörter nicht sowohl in der Wortfindung selbst als vielmehr in der Erkennung des Bildes begründet zu sein. Damit hängt es zusammen dass ich einige Bilder gerne länger betrachtet hätte. Die Wörter galten als die Bezeichnungen für die Bilder bzw. die Gegenstände die in ihnen dargestellt waren, und hatten einen anderen Sinn, eine allgemeinere Bedeutung als die Beziehung auf die einzelnen Bilder oder ihre Gegenstände. (14ten Nov.)

² Beim Hersagen taucht einfach ganz plötzlich ein optisches Bild auf. Wenn das Bild schnell auftritt, dann ist es meistens vollständig. Wenn ich einige Zeit suchen muss, dann taucht zuerst etwas besonders auffälliges am Gegenstand auf. Dann kommen weitere Qualitäten, *z. B.* zur Farbe die Form, und sobald diese Ergänzung einen grösseren Grad erreicht hat ist die Bedeutung auf einmal da, und sobald ich die Bedeutung habe, scheint mir der Gegenstand noch deutlicher zu werden. *Z. B.* Ich sehe auf einmal den eigenartigen Glanz der "Perle." Dann kommt mir die runde Form, und dann auf einmal weiss ich was es ist. (10ten Dez.)

found in memory and not in perception is strong evidence against any such theory. Here the nature of the occurrence points to the fact that an image as such means nothing just as Professor Titchener himself claims. It must be interpreted. It can be interpreted only when sufficient data is present. When this is the case, the subject *knows* what it is. This knowledge of what the image represents is not reported as a sensory element added to the elaboration of the image. A new image would itself have to be recognized. The interpretation of the image is a *knowing*. It is something which follows the awareness of the image just as understanding follows the sensations involved in perception.

REPETITION OF PICTURES

"The repetition took place in this manner: First I thought of the first member of the series. Then without holding more strictly to the order of perception each word was spoken following an imaginal representation of the pictures. When I stopped, I attempted to bring up to myself the series. Only by the rising up of a visual image did I obtain a new word."—Subject Külpe, Nov. 14.¹

Such introspections as these suggested a further investigation. The subjects had noticed a certain sequence of events in the process of perception. Would it be possible to react to the events that had been noted? If meaning comes before imagery in the perception of printed words, would it be possible for the subject to react, now to imagery and now to meaning? And if so, what would be the quantitative results?

In the experiments here reported this problem was attempted, to investigate, namely, by means of reaction time the temporal relations of meaning and imagery in the perception of printed words and pictures. The experiments were made in the psychological laboratory of Professor

¹ Das Hersagen geschah so dass ich mich zunächst auf das erste Glied der Reihe zurückbesann. Danach wurden die einzelnen Wörter im Anschluss an die anschaulichen Vorstellungen der Bilder ohne die Ordnung der Wahrnehmung strenger einzuhalten genannt. Wenn ich stockte, suchte ich mir die Reihe wiederzuvergegenwärtigen und bekam erst durch eine neue Auftauchung des Vorstellungsbildes ein neues Wort (Nov. 14th).

Külpe in Munich during the winter semester of 1913-14 and the summer semester of 1914. The author wishes to take this opportunity to thank Professor Külpe for his great kindness, for his interest and suggestions, and for the sacrifice of his time as subject.

II. METHOD OF RESEARCH

The words and pictures used in these experiments designated simple familiar objects—all capable of being visualized; *e. g.*, tree, lamp, knife. Abstract words, prepositions, etc., were not used, in order that conditions might be as favorable as possible for the development of imagery. Had such words been used the difference that was found in reaction time for meaning and imagery would have been much greater. The use of such words would indeed have been justified. For if sensations and images must explain all meanings they must be involved, and exclusively involved, not merely in the perception of things that can be immediately sensed, but also in more abstract mental content. In order, however, to test the theory on the ground where it is best able to stand, it was concluded to forego the use of any words except those that represented familiar sensory objects.

The accompanying plates give an insight into the material used in these experiments. Most of them represent objects that can be named by a one or two syllable German word. The words used were printed on cards in a large legible type.

The use of control words and drawings enabled one to be sure that the subjects were actually reacting to meanings. The controls used in the series of words were nonsense combinations of letters forming one or two syllables. The controls used in the series of pictures were meaningless drawings. In general, the subject was instructed to react (by releasing a telegraph key) in case the word or the drawing represented some real object. The words were exposed by a combination memory and tachistoscope apparatus. The reaction times were measured by a Hipp chronoscope. This was controlled by a pendulum constructed in accordance with a design by Professor Külpe. The variable error in the

chronoscope was negligible—averaging less than 3σ . The constant error was about 70σ . Nine subjects took part in the experiments. A preparatory signal ($1\frac{1}{2}$ sec.) was given verbally with the aid of a stop watch.

III. SIMPLE¹ MEANING AND VISUAL IMAGERY

(a) *Quantitative Results*

The instructions to the subject in this experiment will indicate the precise nature of the problem. They are reproduced without translation. The subject read them over at the beginning of each period. A few trial periods were necessary for some subjects in order that they might learn not to react to the control word. These preparatory series were not included in the final results. One of our subjects (Gl.) never did get free from erroneous reactions and his results show a marked difference from the others.

Sie werden nach einem Signal ein Wort zu sehen (bzw. zu hören) bekommen. Ich bitte Sie zu reagieren wenn Sie das Wort verstanden oder seine Bedeutung erfasst, bzw. wenn Sie eine Gesichtsvorstellung von dem durch das Wort bezeichneten Gegenstand gehabt haben.

Die Wörter 'Bedeutung' und 'Vorstellung' werden Ihnen angeben ob das eine oder das andere verlangt wird. Nachher bitte ich mir kurz das Erlebnis zu charakterisieren, and dabei anzugeben, ob die aufgetauchte Vorstellung an die Stelle der Bedeutung gesetzt werden konnte, etwa bloss die konkrete anschauliche Erfüllung dessen war, was in der Bedeutung abstrakt intendiert wurde.

In this series, therefore, the subject reacted either (a) To the awareness that the word had a meaning, or (b) To the awareness of the visual image of the object.

If there is no difference between meaning and the visual image of an object represented by a word the average of the two series should be approximately the same. The subject ought not to be able to distinguish meaning and imagery

¹ By 'simple meaning' is not meant an absolute simplicity. The word is used to contrast this set of experiments with a later one where the more complex consciousness of purpose was required.

and this should manifest itself in averages for the two sets of reactions that approached each other within the limits of experimental error. If meaning, however, is produced by or is identical with the visual image which accrues to the sensations involved in the perception of the word, the image series should be shorter if anything than the meaning series. The results are given below. The tables are clear without any explanation, except perhaps, that in column *T* is given the

SUBJECT GI

Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
23/VI	{ Zange	1,182	628	23/VI	{ Rechen	368	154
	{ Fernglas	563	9		{ Besen	563	41
	{ Pfeil	233	321		{ Gabel	751	229
	{ Messer	639	85		{ Truthahn	686	164
26/VI	{ Lampe	640	86	26/VI	{ Esel	676	154
	{ Sichel	660	106		{ Trichter	550	28
	{ Säbel	472	82		{ Dreick	602	80
	{ Stuhl	527	27		{ Nest	662	140
7/VII	{ Eimer	429	125	7/VII	{ Aal	558	36
	{ Baum	472	82		{ Geige	338	184
	{ Trichter	346	208		{ Fernglas	597	75
	{ Korb	482	72		{ Besen	424	98
10/VII		12)6,645	1,831	10/VII	{ Korb	462	60
		554	152		{ Maske	249	273
					{ Meissel	351	171
						15)7,837	1,887
						Mean = 522	126
						Median = 563	

Reactions to visual imagery equal or below median = 8.

SUBJECT GRÜNINGER

Words

Date	Visual Image	<i>T</i>	<i>V</i>	Date	Simple Meaning	<i>T</i>	<i>V</i>
11/II	{ Auge	902	341	11/II	{ Schuh	682	18
	{ Ballon	1,092	151		{ Nase	787	87
	{ Kuh	1,660	417	16/II	{ Fass	661	39
16/II	{ Bohrer	1,277	34		{ Schwan	659	41
	{ Sofa	1,261	18		{ Schaf	781	81
	{ Stiefel	1,229	14		{ Ring	531	169
25/II	{ Schuh	1,103	140	25/II	{ Auge	680	20
	{ Fass	1,462	219		{ Ballon	705	5
	{ Nase	1,200	43		{ Fass	660	40
					{ Kuh	856	156
		9)11,186	1,377			10)7,002	656
		1,243	153			Mean = 700	65
						Median = 681	

Reactions to visual imagery equal to or below median = 0.

SUBJECT KÜLPE

Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
9/II	{ Löwe	1,690	790	9/II	{ Kerze	517	14
13/II	{ Ballon	944	44	13/II	{ Schuh	538	7
	{ Auge	675	225		{ Ring	434	97
	{ Rose	1,097	197		{ Nase	799	268
16/II	{ Fliege	802	98	16/II	{ Dampfschiff	540	9
	{ Veilchen	753	147		{ Fass	573	42
	{ Kuh	848	52		{ Ballon	708	177
23/II	{ Kerze	839	61	23/II	{ Fliege	420	111
	{ Schuh	897	3		{ Schuh	577	46
	{ Nase	813	87		{ Löwe	607	76
18/5	{ Ring	800	100	18/V	{ Veilchen	375	156
	{ Dampfschiff	649	251		{ Rose	460	71
		12) 10,807	2,055		{ Kuh	363	168
		900	171			13) 6,911	1,242
						Mean = 531	95
						Median = 540	

Reaction to visual imagery equal to or below median = 0.

SUBJECT LEHNER

Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
16/II	{ Rechnen	381	263	16/II	{ Schwan	445	24
	{ Buch	1,131	487		{ Bohrer	1,007	538
	{ Rettich	611	33		{ Sofa	663	194
	{ Nase	604	40		{ Rose	317	152
	{ Trichter	584	60		{ Brief	691	222
	{ Dreieck	490	154		{ Palme	500	31
30/VI	{ Blatt	597	47	30/VI	{ Baum	399	70
	{ Bär	606	38		{ Hirsch	389	80
	{ Krone	479	165		{ Spaten	406	63
	{ Veilchen	488	156		{ Aal	407	62
	{ Treppe	631	13		{ Krug	395	74
	{ Ofen	572	72		{ Tasse	489	20
	{ Säbel	588	56		{ Schädel	426	43
3/VII	{ Geige	461	183	3/VII	{ Ohr	435	34
	{ Pfeil	451	193		{ Spaten	518	49
	{ Meissel	515	129		{ Hirsch	371	98
	{ Fernglas	874	230		{ Baum	483	14
	{ Flasche	758	114		{ Palme	524	55
	{ Krug	691	47		{ Bär	368	101
7/VII	{ Tasse	736	92	7/VII	{ Krone	384	85
	{ Schädel	918	274		{ Ofen	429	40
	{ Ohr	844	200		{ Veilchen	344	125
	{ Ballon	803	159		{ Treppe	398	71
		23) 14,813	3,205			23) 10,788	2,245
		644	139			Mean = 469	97
						Median = 429	

Reaction to visual imagery equal or below median = 1.

SUBJECT MAREZOLL
Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
11/V	{ Ohr	1,308	221	11/V	{ Käfer	841	254
	{ Zwickel	1,633	104		{ Kerze	638	051
	{ Eule	1,598	69		{ Storch	831	244
12/V	{ Schnecke	1,374	155	12/V	{ Katze	576	011
	{ Pfau	2,721	1,192		{ Kuh	822	235
	{ Käfer	3,868	2,339		{ Schlange	761	174
	{ Maus	2,610	1,081		{ Löwe	774	187
14/V	{ Schaf	1,309	220	14/V	{ Stier	458	129
	{ Hirsch	1,222	307		{ Geier	325	262
	{ Zirkel	1,210	319		{ Ohr	508	079
16/VI	{ Eimer	1,021	508	16/VI	{ Eule	398	189
	{ Stuhl	947	582		{ Schnecke	676	089
	{ Sichel	870	659		{ Schlange	582	005
	{ Kerze	1,187	342		{ Storch	693	106
	{ Geier	1,367	162		{ Kuh	650	073
	{ Stier	988	541	19/VI	{ Kerze	465	122
19/VI	{ Lowe	1,607	78		{ Katze	684	097
	{ Schlange	1,292	237		{ Maus	456	131
	{ Kuh	1,571	42		{ Pfau	436	151
	{ Katze	1,146	383		{ Schaf	697	120
	{ Storch	1,258	271	30/VI	{ Hirsch	384	203
					{ Zirkel	406	181
					{ Sichel	594	007
					{ Stuhl	425	162
					{ Eimer	557	030
		21)32,107	9,812			25)14,687	3,292
		1,529	467			Mean = 587	152
						Median = 582	

Reactions to visual imagery equal or below median=0.

SUBJECT MOORE
Words

Date	Visual Meaning	T	V	Date	Simple Meaning	T	V
9/VI	{ Schuh	839	330	9/VI	{ Finger	516	53
	{ Sofa	1,685	516		{ Buch	337	126
	{ Rechen	1,112	57		{ Schere	444	19
	{ Auge	1,448	279		{ Bürste	572	109
	{ Lampe	1,145	24		{ Fernglas	563	100
	{ Dampfschiff	857	312		{ Uhr	401	62
12/VI	{ Ochse	1,553	384	12/VI	{ Schuh	484	21
	{ Frosch	1,009	160		{ Tiger	758	295
	{ Kamm	794	375		{ Vogel	259	204
	{ Bürste	815	354		{ Rechen	386	77
	{ Pinsel	1,091	78		{ Fernglas	396	67
	{ Besen	1,108	61		{ Sofa	245	218
30/VI	{ Handbeil	1,188	19	14/VII	{ Kamm	572	109
	{ Vogel	1,155	14		{ Auge	583	120
	{ Tiger	1,275	106		{ Frosch	436	27
	{ Uhr	1,209	40		{ Bürste	440	23
	{ Schere	937	232		{ Dampfschiff	478	15
14/VII	{ Schuh	1,445	276			17)7,870	1,645
	{ Rechen	1,544	375			Mean = 463	96
		19)22,209	3,992			Median = 444	
		1,169	210				

Reactions to visual imagery equal or before median=0.

SUBJECT SCHERREN

Date	Visual Image	T	V	Date	Simple Meaning	T	V
22/VI	Krebs	9,807	5,140	13/VII	Fliege	656	104
	Stern	4,537	130		Facher	988	228
	Herz	3,370	1,297		Finger	846	86
13/VII	Trommel	6,505	1,838		Herz	788	28
	Spinne	4,587	80		Fliege	1,034	274
	Koffer	2,531	2,136		Stern	1,080	320
	Flasche	3,159	1,488		Krebs	963	203
	Hirsch	3,411	1,256		Koffer	552	208
20/VII	Säbel	5,354	687	21/VII	Spinne	697	63
	Traube	5,402	735		Trommel	561	199
	Engel	5,340	673		Säbel	631	129
	Facher	2,007	2,660		Flasche	969	209
					Engel	378	382
					Traube	501	259
		12)56,010	18,120			14)10,644	2,692
		4,667	1,510			Mean = 760	192
						Median = 742	

Reaction to visual imagery equal or below median = 0.

SUBJECT STAPPEN

Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
12/II	Ring	572	87	12/II	Veilchen	604	63
	Auge	613	46		Fass	743	202
	Ballon	584	75		Kerze	514	27
	Stiefel	656	3		Löwe	509	32
	Schaf	634	25	17/II	Rose	497	44
	Rettich	1,076	417		Kuh	423	118
17/II	Nase	565	94		Haken	573	32
	Fass	600	59		Lilie	507	34
	Rechen	657	2	19/II	Storch	511	30
	Nest	874	215		Sichel	614	73
19/II	Sage	707	48		Lampe	516	25
	Maske	632	27		Sofa	485	56
	Uhr	518	141				
	Esel	537	122				
		14)9,225	1,361			12)6,496	736
		659	97			Mean = 541	61
						Median = 513	

Reactions to visual imagery equal or below median = 0.

reaction times in thousandths of a second. Under *V*, the variations from the mean.

At the bottom of each column the mean reaction times and mean variations have been calculated. The median for the reaction times to meaning have also been determined.

With but one exception, our nine subjects show a marked difference in their reactions to meaning and imagery. The

SUBJECT T

Words

Date	Visual Image	T	V	Date	Simple Meaning	T	V
27/VII	Kette	1,129	58	27/VII	Puppe	747	255
	Nest	1,162	25		Bretzel	794	302
	Trichter	1,774	587		Mond	754	262
	Stuhl	890	297		Schädel	546	54
	Anker	1,306	119		Taube	884	362
	Ballon	1,257	70		Zirkel	753	261
	Auge	1,216	29		Hirsch	520	28
	Apfel	905	282		Engel	569	77
	Eimer	1,295	108		Besen	499	7
	Ofen	1,109	78		Pferd	517	25
	Kuh	995	192		Hund	498	6
	Tiger	1,260	73		Geige	464	28
	Fass	1,132	55		Schiff	667	175
	Strumpf	879	308		Tiger	347	145
	Schrank	1,263	76		Schnecke	453	39
28/VII	Schlange	866	321	28/VII	Pfau	554	62
	Facher	1,259	72		Fliege	470	22
	Herz	1,845	658		Fahne	441	51
	Hahn	947	240		Finger	793	301
	Krebs	2,176	989		Stern	369	123
	Spinne	1,516	329		Trommel	335	157
	Hase	1,072	115		Koffer	525	33
	Schlitten	906	281		Nase	527	35
	Feile	1,541	354		Schlüssel	556	64
	Hand	900	287		Hammer	479	13
	Handschuh	871	316		Spaten	411	81
	Eule	999	188		Bär	401	91
	Kirsche	921	266		Klavier	663	171
	Löwe	802	385		Kerze	419	73
	Leiter	1,415	228		Bleistift	381	111
29/VII	Fernglas	1,677	490	29/VII	Nest	352	140
	Wiege	1,336	149		Wage	367	125
	Wurst	993	194		Bohrer	307	185
	Löffel	806	381		Fliege	304	188
	Haken	2,115	928		Trommel	376	116
	Veilchen	1,315	128		Brille	362	130
	Treppe	919	268		Lilie	369	123
	Bretzel	779	408		Blatt	303	189
	Turm	894	293		Bürste	312	180
	Trichter	1,030	157		Truthahn	301	191
		40) 47,472	10,782			40) 19,689	4,981
		1,187	269			Mean = 492	122
						Median = 474	

Reactions to visual imagery equal or below median = 0.

one exception is not to be explained by individual difference in mental type, but rather by an anxiety to react as quickly as possible. At first he reacted to every nonsense word. He was then tried with pictures. Here again, every meaningless drawing elicited a reaction in spite of instructions. The reaction times at first varied around 100 σ . Later he was

asked to wait each time and make a judgment that he had fulfilled the task given him. Even under these instructions, he continued to react occasionally to nonsense words—the following reaction being very much retarded. He finally gave up the experiments. What would have resulted had he by practice become entirely free from erroneous reactions one cannot say. It would seem, however, more fair to a just conclusion to exclude rather than include his results in our summary. Leaving aside the results of this subject, the reaction times to visual imagery were all but one above the median of the reaction time to meaning. It is worthy of note that this single exception is the first recorded reaction of this subject. (He had made several practice series before.) Our subjects made 150 reactions in all. Were it merely a matter

SUBJECT MAREZOLL

Wörter

	Visual Image	Simple Meaning	D
Ohr.....	1,308	508	+ 800
Eule.....	1,598	398	+ 1,200
Schnecke.....	1,374	676	+ 698
Pfau.....	2,721	436	+ 2,285
Käfer.....	3,868	841	+ 3,027
Maus.....	2,610	456	+ 2,154
Schaf.....	1,309	697	+ 612
Hirsch.....	1,222	384	+ 838
Zirkel.....	1,210	406	+ 804
Eimer.....	1,021	557	+ 464
Stuhl.....	947	425	+ 522
Sichel.....	870	594	+ 376
Kerze.....	1,187	638	+ 549
Geier.....	1,367	325	+ 1,042
Stier.....	988	458	+ 530
Löwe.....	1,607	774	+ 933
Schlange.....	1,292	761	+ 531
Kuh.....	1,571	822	+ 759
Katze.....	1,146	576	+ 570
Storch.....	1,258	693	+ 565
	20)30,474	11,425	19,259
	1523.7	571.2	962.9

of chance that reaction times to imagery should be longer than those to meaning we could find about 75 longer and 75 shorter. As a matter of fact, we find 149 longer and only one shorter. In spite then of the rather small number of reactions (conditioned by taking the introspective reports) there is over-

whelming evidence to show that something more than chance has to do with the difference in reaction time to meaning and imagery. This difference is not due to the words used for imagery and meaning. Not only were the words in both cases representative of sensory objects but care was taken to repeat the same words in the two series. A table is given above comparing the reactions of one subject for meaning and imagery to the same words. Under *D* is given the difference between the two. The reaction time to imagery is always longer than to meaning. With some of our subjects the results are not so unanimous, the meaning reaction being occasionally longer. This is to be explained mainly by the effects of practice, though something is no doubt due to accidental variation.

(b) INTROSPECTIVE DATA

From the quantitative results that have just been given, it is evident that the subjects give a different response when told to react to meaning or imagery. Were we to stop with the quantitative results we would not know very much about the nature of that difference. Is meaning simply an early stage in the development of the image? Is it a vague confused image? Is it merely the realization of the power to visualize the object? Is it the tendency of a number of images to crowd into consciousness? What is the difference? There can be no doubt that a considerable difference exists and it is of great importance to find out precisely what it is. This can be done by an examination of the subjects' introspective reports of what they experienced during their reactions. The reports were taken down by dictation immediately after the reaction and then re-read to the subject to insure their accuracy. The originals are in German and will be given in German and in English when a complete account of all the experiments is published.

CONSCIOUSNESS OF MEANING

(1) *The meaning has a general character.*

Kerze: "There came to me at once the word 'Light.' This was not a determination of the meaning, but only another word for it. The meaning was entirely general, as if I should say *a* candle, that is, any candle—every possible candle."—Kölpe, 9/II.

(2) *The universality of the meaning is not always absolute.*

Ring: "As soon as I saw this word, I experienced an auditory motor stimulus, and immediately in connection therewith the understanding of that which the word signified. This was quite universal without being related to anything in particular—except the limitation to 'finger-ring.' I am distinctly conscious that a finger-ring was intended. I cannot remember an image of any such ring."—Kölpe, 13/II.

(3) *The meaning is at times felt to be incomplete, because of an unanalyzed consciousness of what the word signifies.*

Schere: "At first, a feeling of familiarity was present and then a feeling of certainty that I know what the word signifies without having analyzed its meaning any further. First, during the reaction itself there came the further thought 'something with which one cuts.'"—Moore, 9/VI.

Eule: "I knew that the word was something with which I am familiar and knew that from this point I could, at any time, go on and find its more specific meaning. Thereupon I reacted. In the word itself there was something presented to consciousness (*mir gegeben*) that I cannot further describe."—Frl. Marezzoll, 10/VI.

CONSCIOUSNESS OF VISUAL IMAGERY

(1) *The image is particular.*

Sofa: "I have a rather good image and I did not pronounce the word. I see with great precision the brown color and the form of the object—but not of the entire object. I could derive several concepts from this one image. It looks like a large reclining chair. The image would not do for all sofas."—Grüninger, 16/II.

(2) *The image is at times schematic.*

Herz: "I read the word 'heart' and apprehended its meaning. I remembered my task and sought after an image. I projected over the place of the card a heart of regular mathematical proportions. Only the contours were imaged, and these by such an airy line that I question myself whether I had a visual image at all or whether it was an ideal construction, such as one carries out in mathematical thinking."—Scherren, 13/VII.

(3) *The image is at times incomplete in a different way.*(i) *It is partial.*

Rechen: "First, the meaning, then the image. Nevertheless, I reacted before the image was clear. I imaged a part of a rake. Already I have noted several times that I image the left lower parts of objects. Here I imaged a wooden rake."—Stappen, 17/II.

(ii) *It represents a single definite character of an object.*

Kuh: "I have the meaning and now I must have an image. I then look at an empty spot—no longer at the word. Then there appears the color of the animal. I see 'brown.' But a satisfactory, complete image, I do not obtain. I must exert myself even to obtain the color. I could not take the image for the meaning. I cannot read anything more out of the image than 'brown'—never the meaning 'cow.'"—Grüninger, 16/II.

CONSCIOUSNESS OF MEANING

(4) *The meaning never has sensory characteristics but rather a conceptual determination.*

Geier: "A moment passed before I found the meaning. No auditory-kinæsthetic image was present. I *knew* that it was something that hovers over mountains in the air—even though I did not see the mountains. Visually I imaged only a pair of extended wings and *knew* that something belonged between them."
—Frl. Marezoll, 14/V.

Veilchen: Immediately after the word appeared, I had an auditory-kinæsthetic image of it—as I pronounce it. 'Veilchen,' and in connection therewith a knowledge of its meaning (Ein allgemeines Bedeutungswissen), that I can thus explain: a definite species of flower. I dare say that it is this which makes up the content of the meaning—what I actually know about this object during the experiment.—Külpe, 18/V.

(5) *The meaning is often expressed in terms of a definition of general application.*

Dampfschiff: Immediately on the exposition of the word, auditory-kinæsthetic image thereof, and a realization of the meaning in the sense of 'a means of transport by water.' This time there was no trace of any image.—Külpe, 16/II.

(6) *The meaning is never localized.*

CONSCIOUSNESS OF VISUAL IMAGERY

(4) *The image manifests degrees of brightness, color and clearness.*

Rose: "Immediately after the word came I had the auditory-kinæsthetic image of the word and thereupon an understanding for its general signification. Then first came an image—the image of a blossom. Almost nothing of the stem was seen. Colorless, mere differences of brightness in the blossom and the leaves were perceived. A full blown rose. The common form. Image and meaning did not cover each other."
—Külpe, 16/II.

Krug: Meaning then the visual image. It was an earthenware jug, bellied out in front—antique as if it had just been dug up.—Lehner, 7/VII.

(5) *The image is often described in sensory terms that would fit only a very definite object.*

Rettich: This time there came to me the image of a radish of medium size. I saw clearly the little hollows in its skin filled with dirt and myself in the attitude in which I cultivate this beautiful variety in my wife's garden. All at once there came to me a poem of Mörike. It is entitled 'The Radish.'—Lehner, 16/II.

(6) *The image has often a definite position.*

Schuh: I had an indistinct image of a laced shoe—the point to the right somewhat behind the plane of the word. A confused consciousness of meaning was also immediately present, which did not coincide with the image. The meaning was even more general than foot covering. It had somewhat the sense of a piece of clothing without relation to a part of the body.—Külpe, 23/II.

CONSCIOUSNESS OF MEANING

(7) *The meaning is always pertinent to the word.*

(8) *The meaning is never looked upon as superfluous.*

(9) *The meaning is always present.*

(10) *The meaning leads regularly to the image.*

Nearly always the subjects report the meaning as coming first.

(11) *The meaning comes spontaneously.*

Cases enough have already been cited to make this evident. Only occasionally, where the word is read incorrectly, is any effort required to bring out this meaning.

¹ These cases are very rare. I have found them only with this subject and when he does mention them, it is always with reserve. He says 'I believe' indicating that he is not sure of the observation.

CONSCIOUSNESS OF VISUAL IMAGERY

(7) *The image is sometimes recognized as not strictly pertaining to the word.*

Rettich: The word appeared very strange to me. I think I read something like 'Bettish.' Only later did I get the correct meaning. There came a visual image. The image did not really represent a radish but rather a kind of turnip.

(8) *The image is often regarded as unnecessary and of secondary importance.*

Ochs: I first understood the word as something familiar, as something that I knew what it was. A further analysis of the meaning did not take place. Under the influence of the task, my attention was directed to experiencing an image and then arose the head of an ox with his horns as drawn in the pictures for these experiments.—Moore, 12/VI.

Fass: Immediately after looking at the word an auditory-kinæsthetic representation and understanding of its general signification in the sense of a spatial measure. There came also—altogether fleetingly a weak image with a pair of hoops lying on the ground—wholly accessory as if a schema.—Külpe, 16/II.

(9) *The image is often lacking.*

Such cases could be multiplied indefinitely. Some have already been given.

(10) *The image is only occasionally present before the meaning.*

Kuh: I believe! the image came first—wholly undefined. Very soon thereafter the meaning, immediately after which the reaction.—Stappen, 17/II.

The image must often be sought.

Flasche: I had the feeling of a considerably retarded flow of imagery, and perceived clearly that I was sharply concentrated upon my task. I then imagined that I went through Amalien Street and

CONSCIOUSNESS OF MEANING

CONSCIOUSNESS OF VISUAL IMAGERY

had the task to represent to myself a bottle. The representation succeeded but rather poorly. Only the image of the material (glass) and the long form was clear.—Lehner, 3/VII.

A careful consideration of these results will show that the difference between meaning and visual imagery does not consist in any possible difference in the original imagery itself.

If meaning were an early stage in the development of the visual imagery, it might be possible to explain in this way the difference in the reaction times to the two events. A candid consideration of the introspections shows that this is not the case. The universality of the meaning cannot be pictured and is something quite different from the schematism of the image. The incompleteness of the image with a fragmentary character and washed out coloring differs profoundly from the imperfect unanalyzed embryonic stage of the meaning. The image has sensory characters which cannot be ascribed to the meaning—the meaning cognitive characters which are utterly foreign to the image. The meaning is a 'knowing' *sui generis*; the image is a sensational element with its own specific character.

The meaning is not the potentiality to visualize. It may have an element of potentiality about it, but it always has an element of actuality which extends from the unanalyzed knowledge expressed by the phrase: "I know what that is"—to the more perfect conception expressed by a definition. The potentiality of the meaning when present is not the same for all meanings. It is a definite potentiality in which the elements of a definition of the object are in subconsciousness. It is not the potentiality to visualize, for the potentiality to visualize (1) depends on a meaning to determine what is to be visualized; (2) results in something different from the actualization of the meaning. The actualization of the meaning leads to the consciousness of a definition which may not even be accompanied by imagery of any kind whatever.

Nor is imagery the tendency of a number of images to

crowd into consciousness. That tendency is sometimes present especially with one of our subjects, but by him it was recognized as something that came after the meaning.¹

Meaning is often present and one is definitely conscious of it without being conscious of a tendency of images to crowd into consciousness. Meaning is a consciousness of knowledge that has definite characters foreign to the images that tend to crowd into consciousness. Furthermore, where images do crowd into consciousness they have to be known. This knowledge of what the image represents cannot be explained by another image which would itself have to be known.

Meaning, therefore, appears to be a conscious process *sui generis* distinct from imagery.

IV. CONSCIOUSNESS OF PURPOSE AND KINÆSTHETIC IMAGERY

(a) *Quantitative Results*

The instructions to the subject indicate sufficiently the nature of the investigation in this section of the work. These instructions were as follows:

Sie werden nach einem Signal ein Wort zu sehen bekommen. Ich bitte Sie zu reagieren wenn Sie die Bedeutung des Wortes im Hinblick auf den Gebrauch oder die Funktion des damit bezeichneten Gegenstandes erfasst, bzw., wenn Sie eine kinaesthetische oder kinaesthetisch-optische Vorstellung davon gehabt haben.

The words chosen for reaction stimuli in this set were not merely capable of being visualized but represented objects that most of us have often handled as: brush, bell, hat. To represent a word like 'lion' by a kinæsthetic image is to some subjects a very difficult task. Consequently a more appropriate set of words was chosen. Even under the most favorable conditions the kinæsthetic image comes far too late to account for the meaning. It might, however, be claimed that such an image is identical with the consciousness of the purpose of an object. Accordingly the comparison was made between reactions to the consciousness of purpose and those

¹ Cf. *supra*, p. 178. Subject Lehner.

to the awareness of a kinæsthetic image which concerned the object itself. Mere verbal images were excluded. Seven subjects took part in this set of experiments.

The results are shown in the accompanying tables:

SUBJECT GRÜNINGER

Words

Date	Motor Image	T	V	Date	Concept of Purpose	T	V
2/III	{ Anker	2,084	210	2/III	{ Stiefel	2,247	699
	{ Rechen	1,647	647		{ Koffer	1,389	159
	{ Gabel	1,929	365		{ Bürste	1,292	256
	{ Trichter	2,379	85		{ Flasche	1,671	123
	{ Apfel	2,307	13		{ Wurst	714	834
4/III	{ Wiege	2,448	154	4/III	{ Birne	1,255	293
	{ Eimer	1,690	604		{ Brief	1,474	74
	{ Kette	2,398	104		{ Leiter	1,414	134
	{ Zwickel	2,101	193		{ Fahne	2,255	707
	{ Treppe	2,506	212		{ Finger	1,458	90
	{ Hund	3,745	1,451		{ Kuh	1,474	74
		11) 25,234	4,038		{ Ente	1,942	394
		2,294	367			12) 18,585	3,837
						Mean = 1,548	320
						Median = 1,466	

Number of times median for concept exceeds reaction time for imagery = 0.

SUBJECT KÜLPE

Words

Date	Kinæsthetic Image	T	V	Date	Concept of Purpose	T	V
27/II	{ Ring	1,100	451	27/II	{ Stiefel	804	306
	{ Sichel	1,416	135		{ Auge	1,180	70
	{ Ring	1,332	219		{ Haken	771	339
	{ Rechen	1,823	272		{ Hammer	1,822	712
2/III	{ Bleistift	1,227	324	2/III	{ Bürste	1,346	236
	{ Würfel	2,579	1,028		{ Gabel	1,165	55
	{ Lampe	1,298	253		{ Feile	1,153	43
	{ Pickel	1,638	87		{ Uhr	808	302
		8) 12,413	2,769		{ Stiefel	944	166
		1,551	346			9) 9,993	2,229
						Mean = 1,110	247
						Median = 1,153	

Number of times median for concept exceeds reaction time for imagery = 1.

With all of our subjects the mean for reaction time to kinæsthetic imagery is longer than that to the concept of purpose. Examining these results critically we find that with some of our subjects in spite of the small number of

SUBJECT LEHNER

Words

Date	Kinaesthetic Image	T	V	Date	Concept of Purpose	T	V
2/III	Würfel	1,083	70	2/III	Feile	997	71
	Lampe	1,515	362		Uhr	1,249	323
	Pickel	1,184	31		Stiefel	1,121	195
	Brief	1,693	540		Wiege	684	242
5/III	Leiter	1,145	8	5/III	Eimer	1,050	124
	Fahne	1,501	348		Kette	733	193
	Flasche	1,980	827		Zwicker	815	111
	Treppe	1,162	9		Finger	1,260	334
23/VI	Stiefel	760	393	23/VI	Brief	941	15
	Uhr	804	349		Leiter	1,076	150
	Feile	941	212		Fahne	960	34
	Wiege	826	327		Flasche	937	11
	Eimer	879	274		Treppe	763	163
	Kette	882	271		Würfel	738	188
	Zwicker	927	226		Lampe	721	205
	Finger	1,170	17		Pickel	775	151
		16)18,452	4,264			16)14,820	2,510
		1,153	266			Mean = 926	157
						Median = 937	

Number of times median for concept exceeds reaction time for imagery = 6.

SUBJECT MAREZOLL

Words

Date	Kinaesthetic Image	T	V	Date	Concept of Purpose	T	V
14/5	Buch	1,157	493	14/5	Ring	962	353
	Klavier	1,899	249		Schere	1,215	100
	Eimer	2,148	498		Pinsel	1,942	627
19/V	Korb	1,745	95	19/V	Zirkel	1,966	651
	Pinsel	1,643	7		Schlitten	1,404	89
	Zirkel	4,524	2,874		Schere	2,167	852
7/VII	Schlitten	1,573	77	30/VI	Eimer	3,097	1,782
	Schere	1,071	579		Korb	650	665
	Ring	723	927		Buch	857	458
	Anker	1,884	234		Klavier	807	508
9/VII	Besen	1,270	380	7/VII	Bürste	930	385
	Bohrer	1,422	228		Bohrer	990	325
	Bürste	1,218	432		Besen	749	566
	Zwicker	1,557	93		Anker	1,056	259
	Rechen	1,532	118		Haken	939	376
	Horn	1,069	581			15)19,731	7,996
		1,616	34			Mean = 1,315	533
		17)28,051	7,899			Median = 990	
		1,650	464				

Number of times median for concept exceeds reaction time for imagery = 0.

SUBJECT MOORE

Words

Date	Kinæsthetic Image	T	V	Date	Concept of Purpose	T	V
16/VI	{ Bohrer	1,453	217	16/VI	{ Handbeil	781	36
	{ Spaten	1,129	541		{ Säbel	1,162	345
	{ Haken	1,628	42		{ Pinsel	592	225
18/VI	{ Messer	1,796	126	18/VI	{ Besen	539	278
	{ Burste	1,772	102		{ Nadel	918	101
	{ Zange	1,396	274		{ Rechen	815	2
9/VII	{ Handbeil	1,572	98	9/VII	{ Feile	1,046	229
	{ Pinsel	1,914	244		{ Bohrer	1,004	187
	{ Pfeil	1,222	448		{ Spaten	564	253
30/VII	{ Besen	1,480	190	30/VII	{ Haken	836	19
	{ Wage	1,461	209		{ Hammer	1,215	398
	{ Brille	1,896	226	30/VII	{ Handschuh	412	405
30/VII	{ Feile	2,071	401		{ Löffel	635	182
	{ Kerze	1,459	211		{ Schlitten	1,001	184
	{ Ring	2,234	564	30/VII	{ Leiter	719	98
30/VII	{ Zange	1,722	52		{ Schlüssel	669	148
	{ Bohrer	1,564	106		{ Rechen	967	150
	{ Haken	1,888	218	30/VII	{ Spaten	822	5
30/VII	{ Schere	1,729	59		{ Pinsel	1,028	211
	{ Zirkel	2,014	344		{ Bürste	621	196
		20)33,400	4,672			20)16,346	3,652
		1,670	234			Mean = 817	183
						Median = 818	

Number of times median for concept exceeds reaction time for imagery=0.

SUBJECT STAPPEN

Words

Date	Kinæsthetic Image	T	V	Date	Concept of Purpose	T	V
28/II	{ Kerze	4,308	2,915	28/II	{ Auge	1,199	449
	{ Haken	528	865		{ Säge	682	68
	{ Burste	644	749		{ Sichel	697	53
28/II	{ Würfel	465	928	28/II	{ Gabel	814	64
	{ Sense	1,024	369		{ Feile	362	388
		5)6,969	5,826			5)3,754	1,022
		1,393	1,165			Mean = 750	204
						Median = 697	

Number of times median for concept exceeds reaction time for imagery=3.

experiments we can say definitely that the concept of purpose comes quicker than the kinæsthetic imagery. With these subjects the median for the concept of purpose was shorter than everyone of the reaction times to kinæsthetic imagery. With one subject, one out of eight reactions to kinæsthetic imagery was shorter than the median; with another two out of

SUBJECT TANNHÄUSER

Words

Date	Kinæsthetic Image	T	V	Date	Concept of Purpose	T	V
30/VII	Bohrer	1,492	231	30/VII	Klavier	1,314	456
	Schlüssel	939	322		Bürste	749	109
	Trichter	1,527	266		Fernglas	749	109
	Bleistift	1,367	106		Haken	1,069	211
	Trommel	1,088	173		Leiter	829	29
	Brille	1,903	642		Kerze	885	27
	Rechen	1,327	66		Pickel	1,071	213
	Tasche	1,255	6		Zange	1,816	958
	Wage	1,378	117		Ring	785	73
	Hammer	1,005	256		Schlitten	600	258
	Handschuh	1,158	103		Feile	763	95
	Besen	1,173	88		Spaten	554	304
	Dolch	855	406		Brief	554	304
	Horn	1,011	250		Anker	739	119
	Auge	2,334	1,073		Eimer	1,114	256
	Brunnen	2,216	955		Hut	824	34
	Geige	694	567		Flasche	976	118
	Fass	2,006	745		Glocke	717	141
	Hahn	2,082	821		Fächer	648	210
31/VII	Beil	1,576	315	31/VII	Finger	1,006	148
	Messer	831	430		Fahne	875	17
	Lampe	883	378		Meissel	834	24
	Koffer	797	464		Korb	952	94
	Buch	1,009	252		Kette	817	41
	Hobel	1,007	254		Kamm	816	42
	Handbeil	707	554		Schrank	637	221
	Schuh	848	413		Sense	776	82
	Ofen	849	412		Pfeil	700	158
					Nadel	720	138
		28) 35,317	10,665			29) 24,889	4,989
		1,261	381			Mean = 858	172
						Median = 816	

Number of times median for concept exceeds reaction time for imagery = 2.

twenty-eight. With one of our subjects the matter looks a little doubtful; six out of sixteen are shorter than the median. With another subject¹ the results are too few and scattered to give any quantitative basis for judgment.

The question is one where individual differences are likely to play a part. Those who readily form kinæsthetic imagery may be able to obtain such an image more quickly than they can *think* of the purpose of the object. To what extent this is true cannot be decided from the present results.²

¹ It was impossible to get more experiments from this subject. He left the day after the series above reported and did not return in the summer semester. They are more of the nature of a preparatory series than final results.

² When a short abstract from this paper was read last December at the meeting

Taking all the results together only 12 out of 105 reactions to kinæsthetic imagery were shorter than the median of the various subjects' reaction-times to the concept of purpose.

(b) *Introspective Data*

Turning now to the introspective results, we find that the concept of purpose and the kinæsthetic image are very clearly differentiated. The concept of purpose differs from the simple meaning in that it does not come with the same necessity. It is the result of the subject's task—not of the mere exposition of the stimulus. The same is true of the kinæsthetic image. Both follow upon the awareness of the simple meaning. Neither is a necessary prelude nor a sequence of the other. The task "image" or "concept" is the main factor in determining which is to appear.

The following are some of the more noteworthy introspective differences between the two.

(1) *The concept of purpose is expressed in non-sensory conceptual terms.*

Zwicker: "I imaged my own eye glasses and had clearly a consciousness of concave glasses. I was further conscious of the fact that these glasses must refract the rays of light according to a definite law that the image may still fall upon the retina—even though the lens is incapable of doing it this service. I then formulated the purpose of eye-glasses as: 'The correction of an error of refraction.'"—Lehner, 5/III.

(2) *The concept of purpose sometimes involves the consciousness of the relation of the object to other things.*

Gabel: "Immediately after the appearance of the word an auditory-kinæsthetic image thereof. Then came the know-

(1) *The kinæsthetic image always describes some kind of act involving a use of the muscles.*

Sichel: "Immediately after the word appeared I had an auditory-kinæsthetic image of it. Following this I constructed a visual and weak kinæsthetic image thereof in this manner. I held a sickle in my right hand and made movements therewith as if I were cutting grass. Thereupon I reacted."—Külpe, 2/III.

(2) *This was not noted in the description of the kinæsthetic imagery.*

of the Southern Society for Philosophy and Psychology, Professor Ogden stated that he had reported some years ago at one of the meetings a series of experiments similar to the present in all details. He never published his results, but they were identical with my own. In the interests of a better insight into individual differences it is to be hoped that Professor Ogden will some day give us the advantage of his unpublished results.

ledge that the fork is an instrument for eating, accompanied by a weak visual image of a fork. I was also conscious that 'fork' stands in relation to 'knife.'—Külpe, 2/III.

(3) *The concept of purpose though often restricted to one of various possible ends has always a certain generality.*

Kette: "I pictured to myself a tolerably strong chain and remembered from the days of my youth that such chains were used to tie animals in their stalls. I saw the whole situation of that day rise up before me."—Lehner, 5/III.

(4) *The consciousness of purpose seldom stops with a means but rests in a concept conceived of as the object's end.*

Uhr: "Immediately after the appearance of the word I had an auditory-kinæsthetic image, then the thought: 'The clock must be wound up!' and then the further thought: 'The clock tells the time!' Then I reacted. Weak visual image of a clock on a wall."—Külpe, 2/III.

(5) *The concept of purpose, even though delayed, comes as a natural development of thought about the object.*

(3) *The kinæsthetic image is often perfectly definite and limited to an individual act in a certain time and place.*

Pickel: "I imaged a pick-ax, such as is used for working hard ground and saw myself in my garden in the act of lifting it in the air. The consciousness of the purpose of a pick-ax is a psychological process which cannot be identified with the act of lifting it."—Lehner, 2/V.

Wiege: "The meaning aroused the image of a cradle. I go back in thought to my childhood and feel how I rock my brother. The kinæsthetic image in this case contains a great part of the purpose."—Grüniger, 4/III.

(4) *The kinæsthetic image regularly concerns an act which is a means to the object's end.*

Lampe: "I imaged the lamp that I use in my dwelling, and saw clearly that it did not burn brightly enough, and then imaged the turning up of the wick. The kinæsthetic image of the movement cannot be identified with the consciousness of purpose."—Lehner, 2/III.

Trichter: "Immediately after the simple meaning of the word, I had the visual image of a funnel and then the kinæsthetic image of laying hold of it with my right hand and placing it over an opening. Here also the kinæsthetic image falls short of being the fulfilment of the purpose. For I think that the funnel is the instrument by means of which I pour fluid through an opening, and my image is only the placing of the funnel in the opening."—Grüniger, 4/III.

(5) *The kinæsthetic image is often forced and is superfluous to the understanding of the function of the object.*

Handbeil: "I soon understood the word, but the simple consciousness of meaning was forced into the background of consciousness by the task. I can express this simple consciousness of meaning by the sentence: 'I know well what that is!' Then I asked myself under the influence of my task: 'What purpose does it serve?' Then there came to me the clear concept that it is of use in cutting wood. With this concept of purpose were some broken, confused words. I do not know whether they were German or English. There was also a dark blurred image of an island in Lake George, where I have often cut wood in summer."—Moore, 16/VI.

(6) *The concept of purpose, though at times more or less restricted, never mis-carries entirely.*

Fahne: It was rather difficult for me to connect a kinæsthetic image with the word. At first I imaged a flag as I saw one recently waving on a little tower in Leopold Street. But I said to myself at once, 'This waving is not a kinæsthetic image.' Then I imaged to myself how I would place this flag on the little tower. That the purpose of the flag is not covered by my motor image of it, goes without saying."—Lehner, 5/III.

(6) *The kinæsthetic image is not always pertinent to the purpose of the object.*

Bohrer: "Again the meaning first and then a visual image of the object—of a whole situation. I attempted to screw a drill through the wall, and instead of that I lifted the whole wall with the drill."—Frl. Marezoll, 9/VII.

V. MEANING AND THE WORD

(a) *Quantitative Results*

In the perception of the meaning of words, subjects often spoke of the meaning being associated with an auditory-kinæsthetic verbal image of the word itself. No attempt was made to find out by reaction time the temporal relations of the verbal image and meaning in the perception of printed words. From the introspective results no definite answer can be obtained. The two are so close together that they appear simultaneous. One might, however, surmise that since the word must be read, in order that it may be perceived and understood, verbal sensations or verbal imagery are likely to come prior to understanding.

On account of the close connection with the sensations involved in reading and the understanding of printed words, such material presents no little difficulty in studying the

necessary relations between verbal imagery and meaning. Pictures seemed to offer a more favorable material for study. If meaning is the kinæsthesia of speech, then the knowledge that a picture before me represents a tree should come when I name the picture and not before. A series of reaction times for the naming of pictures and perceiving the meaning of pictures should give approximately identical results. Three of our subjects took part in these experiments.

With all three subjects there is strong evidence that in general it takes longer to react to the word than to the meaning. The means for reaction to the word are, in every case, longer than those for meaning. This excess is also

SUBJECT LEHNER

Pictures

Date	Word	T	V	Date	Simple Meaning	T	V
9/III	Baum	845	214	9/III	Sage	492	1
	Uhr	630	1		Katze	419	74
	Lilie	968	337		Hahn	251	242
	Sichel	638	7		Ring	923	430
	Käfer	626	5		Eimer	500	7
	Hammer	794	163		Krone	629	136
	Treppe	601	30		Pfau	416	77
	Sense	726	95		Hobel	517	24
	Kamel	698	67		Spinne	579	86
	Mitra	775	144		Schlitten	572	79
19/V	Wurfel	840	209	26/V	Fernglas	704	211
	Frosch	649	18		Haue	718	225
	Pinsel	689	58		Krug	536	43
	Apfel	708	77		Stuhl	380	113
26/V	Uhr	493	138	20/VII	Baum	673	180
	Wiege	780	149		Uhr	547	54
	Katze	485	146		Lilie	334	159
	Ring	720	89		Sichel	383	110
20/VII	Haken	563	68		Hammer	558	65
	Säge	594	37		Sense	349	144
	Fernglas	410	221		Kamel	392	101
	Pfau	376	255		Käfer	460	33
	Krone	713	82		Pinsel	468	25
	Eimer	375	256		Treppe	327	166
	Hobel	598	33		Frosch	411	82
	Stuhl	373	258		Würfel	400	93
	Haue	623	8		Wiege	391	102
	Schere	560	70		Apfel	553	60
	Krug	474	157		Korb	344	149
					Mitra	572	79
		29) 18,324	3,392			30) 14,798	3,350
		631	117			Mean = 493	112
						Median = 480	

Number of times median for meaning exceeds reaction time=6.

SUBJECT KÜLPE

Pictures

Date	Word	T	V	Date	Simple Meaning	T	V
9/III	Horn	1,020	98	9/III	Pferd	525	108
	Sofa	767	155		Bürste	510	123
	Rechen	824	98		Haus	798	165
	Dampfschiff	769	153		Ente	308	325
	Kette	825	97		Fahne	673	40
	Zwicker	738	184		Flasche	967	334
	Finger	843	79		Trichter	570	63
	Stiefel	1,692	770		Bohrer	659	26
	Dolch	837	85		Uhr	524	109
	Kerze	1,718	796		Lilie	957	324
	Lilie	957	35		Hahn	573	60
	Sichel	834	88		Käfer	767	134
	Haken	759	163		Hammer	722	89
	Ring	332	590		Löwe	327	306
		14)12,915	3,391			14)8,880	2,206
		922	242			Mean = 633	157
						Median = 616	

Number of times median for meaning exceeds reaction time to word = 1.

SUBJECT MAREZOLL

Pictures

Date	Word	T	V	Date	Simple Meaning	T	V
26/V	Korb	959	48	26/V	Zirkel	998	341
	Schere	825	86		Eimer	643	14
	Pickel	1,862	951		Stuhl	463	194
	Apfel	622	289		Sichel	1,009	352
	Uhr	781	130		Trommel	561	96
	Wiege	729	182		Dampfschiff	463	194
	Tasse	1,175	264		Windmühle	526	131
	Maske	873	38		Kirsche	560	97
25/VI	Lyra	782	129	25/VI	Zither	796	139
	Engel	736	175		Kette	739	82
	Ochs	671	240		Fahne	501	156
	Mitra	913	2		Würfel	628	29
		12)10,928	2,534			12)7,887	1,825
		911	211			Mean = 657	152
						Median = 594	

Number of times median for meaning exceeds reaction time for word = 0.

greater than the mean variation. With one subject in 29 reactions to words, only 6 were shorter than the median for meaning; with another, 1 in 14; with another, 0 in 12.

(b) Introspective Data

Turning to the introspective results we find them in accordance with the quantitative measurements. Time and

time again, whether the task were meaning or word, the same sequence of events was perceived, viz., (1) meaning, (2) word, (3) reaction. Often, however, when the task was meaning, the word was reported as coming during or after reaction.

Some special points of difference between the word and the meaning are given below.

(1) *The meaning leads to the word—the designation of the picture.*

Frosch: "The meaning was first present. I felt a strong striving for the word, as it were from various sides of the drawing. The reaction followed after the entrance of the word."—Lehner, 9/V.

(2) *A meaning cannot be lacking if the subject names the picture—no matter what the task.*

(3) *The meaning is what it is by its own right. It is never said to have a meaning.*

Pferd: "Immediately after I saw the picture I experienced a tone of familiarity and knew what this picture represented. At the same time, with the reaction came the word 'Pferd.' I did not react to the word. The tone of familiarity was related not to the picture, but to what it signified. The picture was a symbol of real objects and its signification consisted herein, viz.—to point to them."—Külpe, 9/III.

(4) *The meaning is sometimes designated by a word which is known to be inappropriate.*

Lilie: "First I recognized in the picture a flower, then I named it by mistake 'Tulpe.' I knew that 'Tulpe' did not fit the picture. Then through the form of the flower, etc., I was occasioned to say 'Glockenblume.'"—Lehner, 9/III.

(1) *The word never leads to the meaning.*

(2) *The word may be lacking when the task is meaning.*

Eimer: The word did not appear at all. Various memories were in the background of consciousness.—Frl. Marezoll, 26/V.

(3) *The word may have a special meaning of its own; e. g., the word has a more general meaning than that of the picture.*

Engel: "Immediately a memory image. After this image came the word. I knew that the meaning of the word was more general than that of the picture."—Frl. Marezoll, 25/VI.

(4) *The word is never designated by a meaning.*

VI. INFLUENCE OF THE OBSERVER'S ATTITUDE

When a short abstract of this paper was read last December at the meeting of the Southern Society of Philosophy and Psychology, it was suggested that the difference in reaction time to meaning and imagery is to be explained by a difference in the attitude of the subject. He reacts quicker when told to react to meaning, not because the meaning is something different from the imagery but because he himself assumes a different attitude.

This objection implies that there is no real difference between meaning and imagery, but that when we call them by different names the subject, for some obscure reason, assumes such a different attitude that it markedly influences his reaction time. The objector in other words does not wish to admit a difference between meaning and imagery, and refers the difference in reaction time to an unexplained and perhaps inexplicable mystery.

To say the least, this explanation is highly improbable. For supposing there is no such thing as a special 'meaning process' and that the accruing image is identical with the meaning, then the task of the subject in the two sets of reactions is really identical. It is simply called by different names. If that were the case, then the subject ought (1) to have a real difficulty in distinguishing his two tasks. (2) He ought to give introspective reports identifying the two procedures. (3) The reaction times ought to be identical within the limits of the probable error.

None of these things were so, but on the contrary (1) The tasks were readily distinguished. (2) The introspective reports clearly separate the two processes. (3) The reaction times are markedly different.

All this tends to render highly improbable, if not impossible, the explanation which suggested that the difference in the reaction times is not to be explained by a real difference in the tasks, dependent on a difference between meaning and imagery, but is due entirely to the difference in the attitude of the subject. In fact, it is very hard even to imagine a

mental mechanism which would produce two separate attitudes with such different effects in the reaction-times, if that to which the subject takes an attitude is in both cases merely one and the same thing that the experimenter calls by a different name.

Let us, however, go a step further. Our subjects reacted to visual and kinæsthetic images. If we wish to compare the reaction times in this case we will find them markedly different. Is it possible to explain that difference by a difference in the attitude of the subject?

If we should argue visual imagery is distinct from kinæsthetic (1) because the subject distinguishes two different tasks when told to react to the one or the other; (2) because the introspective reports clearly separate the one from the other; (3) because the reaction times to visual imagery are much shorter than to kinæsthetic imagery, no one would doubt the validity of the argument. When, however, the same argument is made in regard to imagery and meaning, it is called in question and the attempt is made to explain away the difference by ascribing it to a difference in the attitude of the subject. If, however, the difference in the attitude of the subject is not the real explanation in the latter case, but a real difference between visual and kinæsthetic imagery, then this difference in the attitude of the subject cannot, without any more ado, explain the shorter reaction time for meaning as compared with imagery.

Furthermore, the difference in attitude itself must be explained. Granted that there is a difference in attitude, what is the most likely explanation for the fact? The first thing that comes to mind is that in the two sets of conditions the subject is taking an attitude to two different things. If that is the case then, meaning and imagery must be distinguished. But how distinguished—as two different mental processes or as two aspects of one and the same process?

In the sequence of events that follow the exposition of the stimulus word, there may be, if you wait long enough, not only visual but also kinæsthetic imagery. Are these aspects of one and the same mental processes, or specifically dif-

ferent items in a definite series of events? Reasons have already been given for distinguishing them. These reasons point to events that are qualitatively distinct, and the distinction can scarcely be called in question. But the very same reasons point to meaning as qualitatively distinct from imagery. When, furthermore, one considers the fact that in the understanding of words the meaning process is never absent, but that visual and kinæsthetic imagery may both be lacking, there is an added reason why meaning should not be identified with an aspect of visual or kinæsthetic imagery.

Furthermore, a difference in the attitude of the observer cannot be made the sole reason for the difference in the reaction times.

(i) In the set of experiments referred to in the beginning, the subject's task was to observe and remember a series of words, pictures or objects. Nothing was said about attending to meaning or imagery. He had simply to report what he had experienced—whatever that might be. Here the question of a difference in the "set" of the observer does not enter at all. In these experiments, the subjects reported that in the perception of words, meaning preceded imagery. This suggested the problem of an objective test of the accuracy of the introspection. The reaction time experiments followed, and confirmed with entire satisfaction the introspections of the earlier series.

(ii) In the reaction time experiments no matter what the task—whether the subject is in the meaning attitude or the image attitude, he regularly reports meaning as coming prior to imagery. If the difference in the 'set' of the observer were the sole reason for the difference in reaction time, we should not expect that no matter what his 'set' he would nevertheless observe a rather constant temporal relation between meaning and imagery.

The introspective results and the reaction times are supplementary. When taken together they leave no doubt that we have really been investigating the temporal relation of meaning and imagery.

VII. THE CONTEXT THEORY OF MEANING AND THE TEMPORAL RELATIONS OF MEANING AND IMAGERY

It may now be asked: Whom does all this concern? Who maintains that imagery is meaning? In spite of a certain modification of the image theory of meaning, Professor Titchener's context theory cannot account for the experimental facts brought out in his own and other laboratories. From an analysis of his theory it is apparent that he maintains that meaning is often identical with imagery. In fact under the conditions of our experiments the images and words that followed upon the sensations of the stimulus words and pictures were actually the context. Analogous conscious states have been reported by Cornell observers as the meaning under somewhat similar conditions. But they did not take into consideration the temporal relations of meaning and imagery.

A brief analysis of the context theory of meaning will show how intimately it is concerned with the temporal relations of meaning and imagery.

(a) *Outline of the Theory*

"Meaning, psychologically, is always context."¹ Such is the definition that Professor Titchener gives to a fact of consciousness with which the modern psychology of thought is now interested.

What is context? Context in English is a word used to signify the setting of a sentence or a quotation—its relation to what the author has written before and after the passage in question. Titchener lays particular stress upon what comes after in the definition of psychological context. "Context, in this sense, is simply the mental process which accrues to the given process through the situation in which the organism finds itself." A sensation by itself has no meaning—neither has an image. When a second mental process accrues to a former one—this second mental process is the meaning of the first one. It does not produce a new something called mean-

¹ 'A Text Book of Psychology,' New York, 1911, p. 367.

ing, it is the meaning. "One mental process is the meaning of another mental process if it is in that other's context."²

What are the mental processes that accrue to others and thus constitute their meaning? Originally the secondary process which constituted the meaning was a group of sensations coming from a bodily attitude of the organism. If the animal took an attitude of defence the kinæsthetic sensations thus aroused did not exactly mean—did not signify that something to be feared was at hand. The whole complex of sensations involved constituted the meaning "something to be feared."

At the present day, however, the human mind has passed beyond the elementary stage of the primitive organism. The essential difference between present human intelligence and its early prototype consists in the use of imagery as well as sensations for the constituents of meaning. "Image has now intervened upon sensation and meaning can be carried in imaginal terms."² Thus spoken and written language has become possible. A sensation arouses an image and the image—the psychological process accruing to the sensations—is the meaning of the sensation.

Various types of mind exist. Each has a special tendency to form some kind of imagery in understanding sensations. Indeed "If we were to make serious work of a differential psychology of meaning, we should probably find that in the multitudinous variety of situations and contexts, any mental process may possibly be the meaning of any other."³

It is Professor Titchener's opinion however that of all the possible types of supplementary mental processes, two are of special importance: kinæsthesia and verbal images. Indeed he pushes the verbal theory so far as to say: "The words that we read are both perception and context of perception, the auditory kinæsthetic idea is the meaning of the visual symbols."⁴

¹ *Op. cit.*, p. 367.

² *Op. cit.*, p. 367.

³ 'Lectures on the Experimental Psychology of the Thought Processes,' 1909, p. 178.

⁴ 'A Text-Book of Psychology,' p. 368.

Thus far, Professor Titchener's theory is entirely psychological. But in order to meet all possible contingencies arising from introspections that he or others may report, where meaning shows no trace of a sensory conscious element—a physiological factor is introduced.

Meaning is not always conscious; *i. e.*, the imaginal supplement to the sensation is not always to be found even by the most careful introspection. In such cases the sensory supplement exists—it is a physiological process in the nervous system.

Professor Titchener thus summarizes his theory of perception:

“Our account of the psychology of perception is now, in the author's view, complete. It has embraced four principal points:

“First, under the general laws of attention and the special laws of sensory connection, sensations are welded together, consolidated, incorporated into a group.

“Secondly, this group of sensations is supplemented by images.

“Thirdly, the supplemental group has a fringe, a background, a context; and this context is the psychological equivalent of its logical meaning.

“Fourthly, meaning may lapse from consciousness and conscious context may be replaced by a non-conscious nervous set.”¹

The type of meaning in the third caption is decidedly different from that given a few pages previous. There meaning is context—context is the mental process that follows upon and accrues to another mental process. The examples given are the images spoken of in the second caption. Here we suddenly find that meaning does not lie in the advening images—but in their fringes.

To harmonize this new idea with what has gone before we may suppose that if meaning is conscious (in the sense of being conscious described by Titchener) it is given by the context which may be (*a*) a second group of sensations, (*b*)

¹ ‘A Text Book of Psychology,’ 1911, p. 371.

an image or a group of images, (c) the fringe or background of such images—the fringe itself being always understood as some kind of sensory element or elements, (d) various combinations of (a), (b) and (c).

(b) *The Evidence for the Theory*

In the interests of simplicity we may leave aside the speculations about meaning in the primitive organism and confine ourselves to the explanation of the fact of meaning as we experience it.

On what then, may we ask, is the statement based that meaning is context—that it is a 'sensory complex *B*, following upon sensation or image *A*.' The points of evidence are:

1. Introspection shows that when a word or a sentence is understood and careful search is made we always find some kind of imagery—verbal, kinæsthetic, visual, etc.

Granted that this is so what does it prove? Nothing more than this. In the complex of mental processes called up by the task of understanding a word or sentence imagery is present. It does not show that this imagery is the meaning—which is the very point in question.

Titchener says: "The meaning of the printed page may now consist in the auditory-kinæsthetic accompaniment of internal speech; the word is the word's own meaning."¹

He then refers in a note to introspections in the studies of Watt and of Messer which speaks of meaning being simultaneous with auditory-kinæsthetic imagery. But such a citation is not to the point. The fact that one thing accompanies another is certainly no evidence that the two are identical.

2. Analysis shows no evidence of 'imageless thoughts.'

What analysis shows is the fact of meaning. Many observers have maintained that in their consciousness of meaning sensational elements are lacking. Professor Titchener in his analysis finds also the fact of meaning and giving to the students in his laboratory the task of reporting every mental process that they can observe, he obtains experiences

¹ 'Lectures on the Experimental Psychology of the Thought Process,' p. 177.

far richer in sensational elements than are elsewhere found. Given the task, 'find imagery,' and it will certainly come. And if the subject be told to look for imageless imagery, it will not be found. Meaning and imagery however, have been found both by Professor Titchener and a number of other observers. Facts are common property. It remains for Professor Titchener to prove that meaning is identical with the concomitant or subsequent imagery. This he has not done.

The context theory of imagery demands imagery, when meaning is present. If meaning equals imagery, imagery equals imagery. No imagery—no meaning, must be the conclusion to be drawn from this theory. Nevertheless Professor Titchener shrinks from admitting all that is involved in his doctrine. Why? Because he himself has observed that there are times when he experiences meaning and is not conscious of imagery. He himself, therefore, in spite of the ease with which he images things and situations, has experienced the very state of mind the existence of which he denies.

"In rapid reading, the skimming of pages in quick succession; in the rendering of a musical composition, without hesitation or reflection, in a particular key; in shifting from one language to another as you turn to your right or left-hand neighbor at a dinner table: in these and similar cases, meaning has time and time again, no discoverable representation in consciousness."¹ No discoverable representation in consciousness means no sensational element—no sensational or imaginal complex.

What is Professor Titchener's explanation of such "imageless thoughts" that come to him as he skims over the pages of a book? He has found "imageless thoughts," what then is to be done with them? Explain them away and then deny their existence. How explain them away? Refer them to the nervous system? Meaning here is not imagery for no imagery is present. What is it then? A physiological process, without any conscious accompaniment. Why without any conscious accompaniment? Because by hypothesis the

¹ 'A Text-Book of Psychology,' p. 369.

only conscious processes that come into consideration are sensations and these are lacking.

On the one hand, we have an hypothesis; on the other, a fact—the imageless consciousness of meaning (imageless thoughts) in rapid reading. The fact cannot be accounted for by the hypothesis; therefore Professor Titchener denies the fact. My consciousness of meaning is unconscious. I do not think but my nervous system is thinking for me.

The reference of imageless thought to an unconscious physiological process in the nervous system brings us to a third point in the evidence for Professor Titchener's theory.

(3) "Our psychology is to be explanatory and our explanations are to be physiological."¹

Adherence to this principle and the ruling out of facts that it cannot explain, give to Professor Titchener's theory a certain plausibility.

What can be referred to the nervous system is explained. What cannot be referred to the nervous system is not explained. It is in fact inexplicable. There must be a mistake in the observation. It must be explained away. The nervous system with its sense organs and its centres, can apparently take care of sensations and images. It gives us the sensational elements of our conscious life and apparently excludes anything like imageless thinking. If then we are to explain 'imageless thought' we must analyze it in terms of the elements given by the nervous system, or else explain it away altogether.

Such a procedure, however, places empirical psychology not only under the dominion of metaphysics, but subjects it to one particular metaphysical theory. Under such conditions an impartial empirical study of the mind becomes impossible. Let us first study the facts of consciousness and then build up our metaphysical theories.

Professor Titchener is right in demanding that the science of psychology should be explanatory; he is wrong in maintaining that everything must be explained in consonance with a particular metaphysical theory.

¹ 'A Text-Book of Psychology,' p. 370.

As a matter of fact neither Professor Titchener nor anyone else knows the limitations nor the possibilities of the nervous system. Nor does anyone know, for that matter, what the nervous system may be called upon to do if it is to explain the facts of our conscious life. We do not know all about the facts of consciousness and until we do, explanatory psychology must be careful. We do not know all about the nervous system and it is not wise to distort the fact of consciousness to fit the narrow outlines of our present horizon.

Let us first investigate the facts of consciousness without any timidity about their ultimate explanation. Let us first find out what we have to explain, and then explain it.

The context theory of meaning is not based entirely upon such general considerations as we have picked out from Professor Titchener's writings. There are a number of experimental studies that have been put forward as tests in confirmation of the theory.

Of these, we may analyze two, leaving a more complete account of the literature to a full report of our experiments which we hope to publish later.

Helen Clarke,¹ in an article on 'Conscious Attitudes' took up the problem of the understanding of words and sentences. She confirmed the reports of other observers that 'often the images are adequate, irrelevant or even contradictory' (p. 241). The inadequacy she explained by saying that 'we have no criterion save the facts themselves, by which we can decide how clear or complete an image must be in order to carry a meaning' (p. 241). The contradictory character she accounted for by pointing out that in every one of her cases there was 'sufficient connection between the logical meaning of the word, and the psychological context of the act of understanding, for the latter to carry a general meaning' (p. 242). The fact of irrelevancy, she said, was less easy to explain.

Miss Clarke therefore seems to be conscious of the fact that words have a logical meaning which cannot be identified with the imagery that they evolve. She distinguishes be-

¹ *Am. J. of Psychol.*, XXII., pp. 214-249.

tween the word—the imagery that it evolves—and the meaning that is carried. She finds also that imagery is often irrelevant. Irrelevant to what, we may ask? To the meaning. She therefore realizes a difference between the psychological process called an image and another something of which she is also conscious and which may be termed the meaning of the word. Miss Clarke¹ seems to look upon general meaning as a logical something of which no account need be taken in psychology. If, however, the task of psychology is to investigate all conscious processes, logical meaning cannot be ruled out as ‘outside the sphere of psychology.’² For “logical meaning” is conscious. Its nature is therefore a psychological problem. It is that something to which the imagery is often inadequate, irrelevant and contradictory. Miss Clarke has implicitly at least recognized it as a conscious state, distinct from imagery.

Edmund Jacobson³ investigated by the Method of Introspection (1) The Perception of Letters, (2) The Meaning of Words, (3) The Understanding of Sentences. The instructions to his subjects (three observers) were as follows:

I. Give a minute account of all the mental processes you experience in their temporal order of sequence.

II. Put direct description of conscious processes outside of parentheses, and statements concerning meanings, objects, stimuli and physiological occurrences inside.

The experiments on the perception of letters showed that under the instructions given their meaning is usually accompanied by the arousal of what Jacobson termed designatory processes, viz., kinæsthetic or auditory sensations or both. Jacobson calls attention to the fact that “The main point to note is that the precise statement of meaning is by no means easy.” Nor does he state anything more definite as to what the meaning of a letter is.

The experiments with the meaning of the words were made as follows: “A written word was laid before the observer for a period of one minute. He was instructed to fixate the

¹ Along with Geissler, *Am. J. of Psychol.*, XXIII., p. 194.

² Cf. Geissler, *l. c.*

³ *Am. J. of Psychol.*, 1911, XXII., pp. 553-577.

word, to utter it with quick repetition and to get at its meaning. The concluding ten seconds were marked off by signals; and the observer's task was to report what occurred in consciousness during the particular interval." The observer reported two kinds of imagery: (a) That which appeared as the carrier of the meaning and (b) that which appeared as irrelevant. No logical or psychological test could be found to distinguish between the relevant and irrelevant imagery.

The conclusion of Jacobson was "that the conscious meanings brought out in these experiments are not perfect and static logical meanings of definition. . . . Logically, the representation of meaning is inadequate; psychologically, it is adequate to the demands of the occasion" (pp. 568-569).

In his experiments on the meaning of sentences, Jacobson found cases in which (1) an automatic reading was followed by a perception of the meaning identified with images called forth by the experiment. (2) Cases in which the meaning did not come to the subject at all in spite of a wealth of visual, organic, kinæsthetic and tactual sensations. (3) Cases in which the visual and auditory images and sensations from reading were the sole processes present in consciousness—and yet the sentence had meaning. Jacobson concludes: (1) "Wherever there is meaning there are also processes," *i. e.*, sensations and images of one kind or another. (2) "The correlated meanings and processes are two renderings from different points of view of the same experience."

The first conclusion seems established by the introspective reports, but it holds only for the conditions of these experiments where ample time is given for images to appear and the task is set to report primarily mental processes, *i. e.*, sensations and images; and secondarily, in parentheses, to note meaning as it arises.

The second conclusion: (which is really the "crux" of the whole situation) meaning is an aspect of sensation and imagery, is simply stated and the reader is left to judge for himself on what evidence the conclusion is based. The only evidence in his paper for such an identification is to be sought in the fact that his subjects, as a rule, were not satisfied that they

had anything that corresponded with their idea of meaning till relevant imagery was present. This simply shows that meaning in the Cornell sense is not present till such imagery arises. From Jacobson's own data, it appears, however, that meaning in a broader sense must have been present when meaning in the Cornell sense was denied. When Dr. Geissler, instructor in psychology at Cornell, for 3 seconds, looked at the sentence, "Did you see him kill the man?," and then declared at the end "No meaning all the way through," we can only conclude that "meaning" must have been taken in a very restricted sense. When again he looked at the sentence, "The iron cube fell heavily on the floor," reads it as so many meaningless words, and then on rereading obtains the meaning, a very loud sound, the time of the whole procedure being 4.5 seconds, the conclusion is strengthened that during the experiment, he was seeking for a meaning in the sense of an imaginal representation. In this sense, and in no other, is Jacobson's conclusion warranted. An imaginal representation is some kind of imagery. The sweeping conclusion that meaning is an aspect of imagery requires the proof of another proposition, namely that all meaning consists in imaginal representation.

The data of this piece of introspective work is incompatible neither with the data nor the conclusions of the Külpean school. Indeed it has confirmed the fact that the meaning of a sentence may be present when the sole processes present in consciousness are the visual and auditory images and sensations from reading. And if it be true that on certain occasions, as in Geissler's case, these same processes were present and the meaning was really absent, one should conclude that they cannot be identical with the meaning. In like manner, a physician refuses to admit that a definite microörganism is the cause of a disease—if at times it is found when the disease does not occur, and the disease occurs when the organism is absent. Jacobson should therefore have admitted that there are times at least when meaning is not a mere aspect of sensations and images.

Professor Titchener looks upon the chief value of Jacob-

son's work in making the distinctions between the mere statement that meaning is present and the analytic description of the psychological part of meaning. He says that "He finds no specific 'meaning process' underlying the statement of meaning."¹

True it is that Jacobson found no special sensory or imaginal process as the habitual carrier of meanings, but he did not prove that meaning is not itself a conscious process. In fact, his experiments seem rather to confirm the conclusion that meaning is not imagery, but something else altogether.

Had the Cornell School taken cognizance of the temporal relations of meaning and imagery, the context theory of meaning would have been profoundly modified. Imaginal terms may accrue to incoming sensations and constitute by definition their context. Do they constitute their meaning? A determination of the temporal relation that imagery bears to meaning shows that this is impossible. What comes after another cannot be said to cause, or constitute, it, or be identical with it. Meaning, therefore, is not context. What is it—a mere negation? Not at all. It is a definite mental process *sui generis*. What are its qualitative characters? Some of these have been already indicated. A further development of the concept will be given with the fuller account of these investigations.

¹ "Description *vs.* Statement of Meaning," *Am. J. of Psychol.*, 1912, XXIII., p. 182.