

chimps were not random, as predicted by Behaviorist theory, but displayed intelligence and comprehension.

Although no one has explained how insight occurs, the Gestaltists did illuminate certain aspects of how understanding could be achieved. One way humans can do it, unlike animals, is by having something explained to them. Mere listening is not enough, of course, for the listener must achieve the same cognitive structure as the explainer in order to become aware of the essential connections among the relevant facts. Listeners do not have to go through the same creative process as did the original problem solver to arrive at the solution, but their final state of comprehension must be similar.

The educational implications of achieving insight through explanation cannot be overestimated. Not only is it satisfying to grasp the solution to a problem, but it is far less likely to be forgotten than rote memorization, and it can be readily transferred to related new problems. Wertheimer showed, for instance, that once children realize why the area of a parallelogram equals its base times its altitude [see upper left illustration on opposite page], they can find the areas of other geometric figures without having to memorize the formulas. Many modern educators critical of rote learning advocate teaching students to think creatively to achieve insight. Few realize that these "revolutionary" ideas about education originated with Gestalt psychologists.

Gestalt theorists also struggled to describe the creative process through which a person achieves original insight in everyday life. They proposed that problems have certain demands that are readily grasped, which lead people to attempt nonrandom solutions [see "Problem-Solving," by Martin Scheerer; SCIENTIFIC AMERICAN, April, 1963]. Becoming fixated on one hypothesis or one function of an object—often without realizing it [see upper right illustration on opposite page]—is the chief obstacle to insight. When people let go of implicit assumptions, their understanding of a problem is sometimes dramatically reorganized, enabling them suddenly to "see" the solution, complete with the accompanying "aha!" experience.

Modern researchers on human problem solving have not yet explained insight, but they have abandoned the Behaviorist idea of blind trial and error in favor of one more consistent with Gestalt ideas about the value of comprehension. One promising focus of recent research has been the use of analogies in problem solving: those who under-

stand one topic can apply this knowledge elsewhere through analogy.

The Gestaltists made further inroads against the Behaviorist approach in the realm of social psychology. Beginning in the late 1930s, three investigators—Kurt Lewin, Fritz Heider and Solomon E. Asch—rejected the idea that social behavior could be explained solely as a response conditioned by societal rewards, such as approval or praise. Rather, they argued, people make sense of the behavior of others by attributing to them feelings, perception, goals, beliefs and intentions—a view known as attribution theory. As obvious as this idea sounds, it was a radical departure from the prevailing Behaviorist approach, which minimized or denied subjective states of mind. Attribution theory has since displaced Behaviorism as the dominant view in social psychology.

Few of Lewin's ideas have survived in contemporary psychology, but the work of Heider and Asch has had lasting influence. Heider applied Gestalt ideas about object perception to the perception of others. One cornerstone of his theory was the idea of attribution: that people try to account for one another's behavior in terms of deeper causal explanations, such as motives and intentions, using context and behavioral consistencies. Heider also developed the concept of balance: the idea that individuals prefer harmonious cognitive relations. For instance, if Jane likes person X and thinks X likes person Y, then the system of beliefs will be balanced if Jane also likes Y—and imbalanced if she does not. This idea echoes the principle of *Prägnanz*: the tendency to achieve the best or most basic organization.

Heider's seminal work on balance theory is related to the late Leon Festinger's theory of cognitive dissonance. Because Festinger believed people seek to reduce inconsistencies in their beliefs, feelings and behavior, he studied how people's choices affect their subsequent beliefs and attitudes. He reasoned that when a rejected alternative (say, a sporty but temperamental car) is in many ways more desirable than the chosen one (a staid but reliable car), the fact that it was not chosen will produce an inner state of disharmony—or dissonance, as Festinger called it—which produces pressure toward eliminating it. One way to reduce dissonance is to reevaluate the relative attractiveness of the alternatives, such as devaluing the unchosen one (sporty cars are too dangerous anyway), thereby enhancing the chosen one.

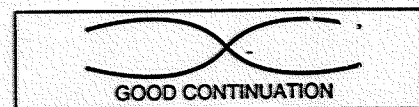
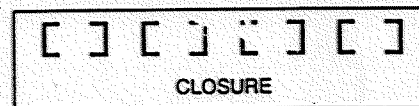
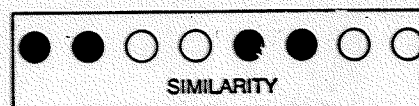
Asch, who worked with Wertheimer at the New School for Social Research, directly extended Gestalt theory to social psychology. He contended that attitudes are rooted in beliefs, that beliefs are rooted in information and that beliefs tend to be rational rather than molded by "suggestion," as early social psychologists thought. His emphasis on human rationality conflicted with the seeming irrationality of phenomena such as racial prejudice. Asch argued, however, that even prejudice can be understood as being reasonable and rooted in information, albeit misinformation. For example, if children depend on parents and other respected adults and have little reason to mistrust them, accepting adult opinions about an ethnic or racial group is a reasonable thing to do. Moreover, children get little if any information from other sources to contradict what they have been told by their parents.

Asch also challenged the Behaviorist assumption that beliefs and attitudes result from suggestions based on the prestige of the source. For instance, American college students were known to change their opinion of a statement depending on who they believed had made it. When told Thomas Jefferson

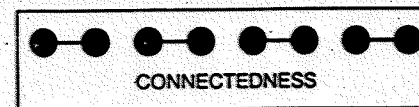
NO GROUPING



GESTALT LAWS OF GROUPING



NEWLY PROPOSED LAWS



Now, at last, it becomes possible to state the fundamental hypothesis of temporal gestalt perception, on which the current model is based:

A new TG at the next higher level will be initiated in perception whenever a TG occurs whose disjunction (with respect to the previous TG at the same hierarchical level) is greater than those immediately preceding and following it.

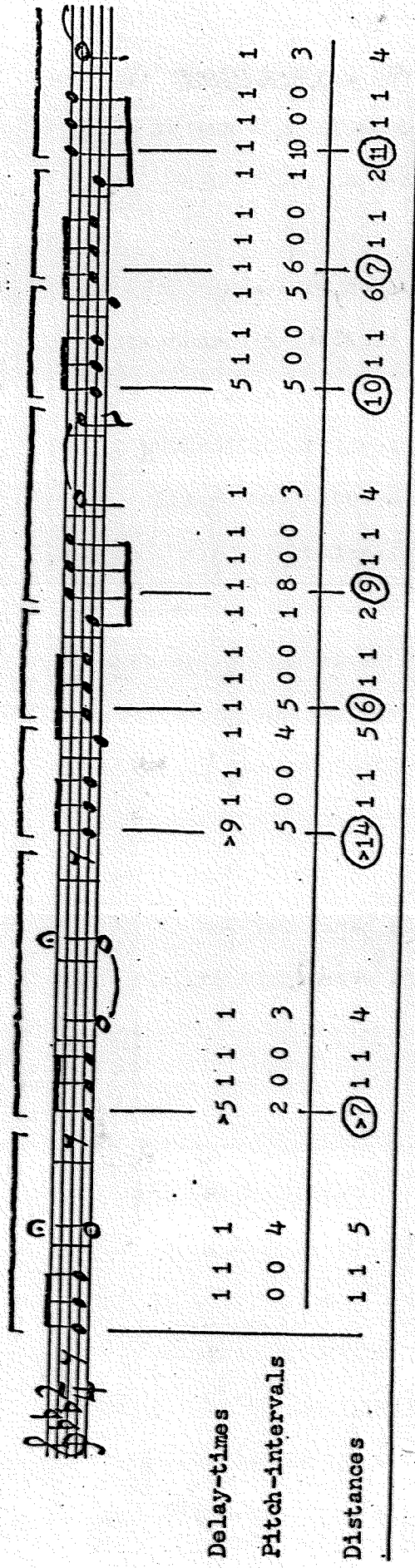


Figure II.4. Clang-initiations determined by inter-element distances.

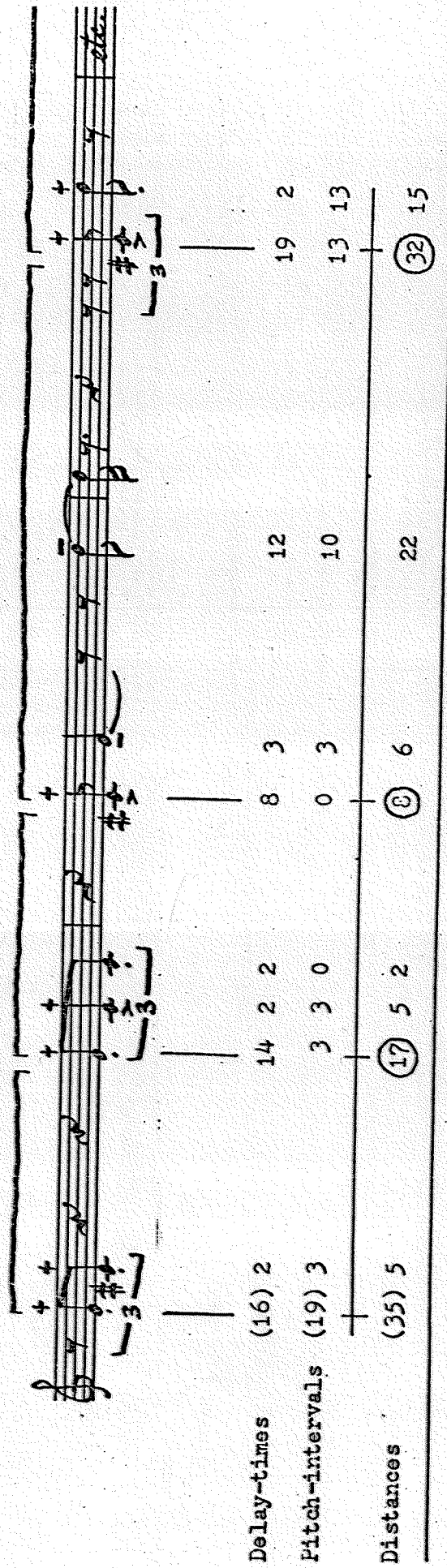


Figure II.5. Clang-initiations determined by inter-element distances.

Edgard Varèse

DENSITY 21.5

*Laurie
Polansky*

for flute alone

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NEW YORK

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COL. 3

DENSITY 21.5*

Flute Solo

EDGARD VARÈSE

$\text{♩} = 72^{**}$

mf *f* *mf* *p* *f* *mf*

f *p* *mf* *p subito*

f *ff* *mf subito* *ff* *f*

ff *p* *f* *p*

ff *p subito* *p*

f *ff* *p subito* *p* *f* *p subito*

(sharply articulated)***

mp *p* *p* *mp* *mp*

* Written in January, 1936, at the request of Georges Barrère for the inauguration of his platinum flute. Revised April, 1946. 21.5 is the density of platinum.

** Always strictly in time—follow metronomic indications.

*** Notes marked + to be played softly, hitting the keys at the same time to produce a percussive effect.

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2nd Part

Measures: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41

Section A: 11-31

Section B: 32-39

Section C: 40-41

3rd Part

Measures: 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62

Section A: 42-51

Section B: 52-59

Section C: 60-62

4th Part

Measures: 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83

Section A: 63-72

Section B: 73-80

Section C: 81-83

Figure IV.1 (p. 2 of 3).

Musical score for Figure IV.1, p. 3 of 3. The score is written on three systems of staves. The top system (measures 62-72) features a melodic line with slurs and accents, and a bass line with fingerings (I, B) and dynamics (p). The middle system (measures 71-80) continues the melodic line with slurs and accents, and the bass line with fingerings (I, C) and dynamics (p, pp). The bottom system (measures 81-84) shows the melodic line with slurs and accents, and the bass line with fingerings (I, IIa, IIb) and dynamics (pp). The score includes various musical notations such as slurs, accents, slurs, and dynamics.

Figure IV.1 (p. 3 of 3).

Dedicated to Harriette Miller

PORTALS

*Symphonic Composition
for Full String Orchestra*

by
CARL RUGGLES

"What are those of the known but to ascend and enter the unknown?"

Walt Whitman

Moderato (♩: 69)

Violin I
Violin II
Violas
Celli
Basses

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Section 1

Ruggles: Portals (melodic line)

Segment 1

Optimal weights: Proximity = 1; Pitch (PW)
Temporal Dens

Sequence 1

2

Clang 1

2

3

4

5

1

Moderato

Variant weightings: PW = .3 (all other parameters)

PW = .6 (all other parameters)

IW = 3 (all other parameters)

N.B. Segmentation Clang are used for the analysis of the score

GENERAL COMMENTS

The larger hierarchical segmentation resulting from the optimal weights is as follows:

		<u>EL. #</u>	<u>MEASURES</u>
SECTION I	SEGMENT 1	1-24	1-6
	SEGMENT 2	25-46	6-9
	SEGMENT 3	46-57	10-13
SECTION II	SEGMENT 4	58-89	13-19
	SEGMENT 5	90-128	19-25
SECTION III	SEGMENT 6	129-188	26-35
	SEGMENT 7	189-207	36-38
	SEGMENT 8	208-249	39-46
	SEGMENT 9	250-261	47-50
SECTION IV	SEGMENT 10	262-292	50-54
	SEGMENT 11	293-320	54-59
	SEGMENT 12	321-379	59-69
	SEGMENT 13	380-408	70-75

Thomas Peterson, in The Music of Carl Ruggles, states that Portals has "... a certain semblance to rondo form, since the principle idea recurs (albeit in freely varied fashion) four times during the course of the work, as well as providing the material for the coda. A plausible attempt at conventional analysis might be made as follows:

A	1-6		B	43-50	
B	6-13		D	50-62	
A'	13-19		A ³	62-70	
C	19-26		CODA	70-75	(based on A)" ¹
A ²	26-43				