Piaget’s Need for the Concept of Metaphoric Operativity.

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In *Play, Dreams and Imitation in Childhood*, Piaget addresses himself to the formation of symbols in children’s thinking, symbolic functioning, and the transition from symbolic thought to operational thought.\(^1\) This work is an attempt by Piaget to explain and reconcile the easily observed differences between literal functioning, which he calls operational intelligence, and figurative functioning, which he calls symbolic or preoperational intelligence, Furth is of the opinion that:

> It is one of the ingenious insights of Piaget to have discovered the uniting symbolic character of such different activities as image, play, imitation, and language and to have related these to the development of operative intelligence.

As will become apparent, this writer is not in agreement with either Furth or Piaget.

In his effort to distinguish between literal and figurative functioning, Piaget has made a crucial conceptual mistake which affects not only his theory of symbols, but also his model of Intelligence as well. Piaget has failed to realize that figurative functioning is composed of two categories and not one. These two categories are the symbolic and the metaphoric. Piaget's reduction of the figurative function to being only the symbolic is completely insufficient on both logical and empirical grounds. Piaget's theory of symbols (semiotics), and thus his theory of figurative functioning, can
neither account for or explain such figurative formulations as "the head of a pin," or "matter being composed of electrons and nuclei." or "her brittle heart unable to endure the hammer of love." Such formulations are not symbols, but metaphors; they cannot be explained as "signals," "signs," "signifiers," nor imitations. Although the symbolic function is necessary to explain the figurative, it is not sufficient. As with Piaget’s notion of memory and operative thought, the symbolic constitutes the metaphoric. The very essence of the metaphor is its operativity: the union through transformation of two or more seemingly dissimilar objects or concepts in a workable manner which is consistent with reality. If a metaphor does not do this, we call it a mixed or false metaphor. Whereas logical operativity can only unite and transform the literal knowledge of two or more objects or propositions, metaphoric operativity can unite and transform in any number of combinations both the literal and figurative knowledge of objects and propositions. Additionally, the products of metaphoric operativity cannot be logically deduced in the strict sense of the term from the objects or propositions it utilizes.

What Piaget fails to realize is that the figural functioning he recognizes to be present in language, play, dreams, and art in the broadest sense of the word is not just the symbolic. Piaget's mistake is an epistemological one: namely, (1) his assumption of the invariance of figurative functioning, and (2) his reduction of the figurative to only one category, the symbolic. The activities of play, dreams, language and art may begin in the symbolic (not unlike those of logic beginning in the psychomotor), but they end in the metaphoric. Semiotics cannot sufficiently explain these activities let alone language and art. Further, metaphor is not just a product of language. Not unlike logic, it may exist apart from language in action, behavior and nonverbal activity. When I say, "The state is a ship," I, in my
implied simile, an summarizing the actions and operations the state performs in reality. The language in this statement expresses not
the content of the state, but rather its activities. This metaphor itself cannot be logically deduced from a series of propositions about "states" or "ships." The reason for this logical as well as empirical fact is that words such as "similar to" or "like" are neither signals nor symbols in the Piagetian sense. Such words do not signify or represent for content, for they are devoid of content in the same way that the linguistical expression of logical operations are devoid of content. The function of such words is to supply directions concerning the figurative operations to be performed upon both the literal and symbolic content of "ship" and "State."

Additionally, the nature of figurative operations is not synonymous with those of logical: these two categories of thinking operativity are different. This fact may be simply demonstrated through the following example. We are all familiar with the logical paradigm or syllogism:

All men are mortal  
Socrates is a man  
Socrates is mortal

The conclusion given above is logically permissible and valid. But if I stated the following paradigm or syllogism

All states direct themselves  
Ships direct themselves  
The state is a ship

We would say that the above conclusion is not logically permissible or valid, as it is not necessarily true as in the first syllogism, and it lacks key features of the first syllogism as well. In reality, however, this claim about the conclusion is not true, as this "syllogism" is a metaphor and as a metaphor it is true. The point being made here is that there are two categories of operativity: the literal and the figurative. It is only when we figuratively operate upon the propositions of the second paradigm that the conclusion "The state is like a ship" makes sense and becomes permissible and valid. It is only through an ellipsis of language that the "like," the
directive for the performance of the figurative operation, is excluded. I shall temporarily put this point in abeyance until I more closely examine Piaget’s theory of symbols and the symbolic function.

In Piagetian terms, symbolism freely assimilates reality to the ego without any accompanying schematic changes or accommodation, while imitation just accommodates reality and leads to representation. A symbol is defined by Piaget as the capacity to represent things or events by means of differentiated signs. As such symbols are the representation of one kind of sensory content by that of another as when I let a great oak signify eternal strength. Piaget points out that such symbols have no operativity to them, and on this matter he is essentially correct. From this deduction, Piaget concludes that the symbolic function cannot be termed thinking because the nature of thought is its transformational action character; i.e., its operativity. The essence of intelligence for Piaget is found in its operativity: an operativity that transforms given reality states and leads to such constructs as categories, classes, number, and other such logical notions. Such a conceptualization of intelligence is a description of literal intelligence, which is intelligence characterized by logical thinking only and alone. As such, it can neither explain nor account for the construction of a pun, joke, invention, or new theory. Einstien said, "It is as if time were elastic." Plano said, "It is as if light was both a wave and a particle at the same time." Such statements are alogical and cannot be sufficiently arrived at through logic alone. It should be pointed out for the sake of the irony involved that the premise that Piaget began with could be summarized in the following terms: "It is as if intelligence evolved along with and like the organism itself."

These above-mentioned constructions are not "categories, classes or other such logical notions." They are expressive of figural rather than literal intelligence. Metaphor assimilates, accommodates, and adapts one idea (or scheme) to another in a manner which cannot be sufficiently
explained by logic or literal operativity. The point here is that metaphor is an operative action. Metaphor is the operative equivalent in the **figurative** realm of Piaget's hypothectico-deductive thought in the literal realm. Not unlike literal thought, metaphor also transforms given realities and leads to constructions, but these constructions are not "categories, classes, number, and other such logical notions." These constructions are "new" and outside of the defined set of existent knowledge, a set which is not static but dynamic and changing with the exercise of the metaphoric function.

The crucial point that has been overlooked by Piaget is that as memory constitutes literal or logical thought, symbolism constitutes figurative or metaphoric thought. The interesting implication here is to note the importance of memory to the functioning of a computer, a functioning that is built upon logical operativlty and the inability of the computer to function figuratively because although we are capable of giving it memory, we are not yet capable of giving it symbolism or metaphoric operativity. The nature of operativity, therefore, is at least a two-dimensional dynamic. First there is literal or logical operativity. This functions within the set of existent "memory-type" knowledge and deduces the nature of the entire or full set. The knowledge that is deduced by logic is not new knowledge in the true sense of the word, but only necessary knowledge given what is already known of the set. The problem here is one of time and sequence and not a problem of the creation of the new. The second dimension of operativity is the figurative or the metaphoric function. The figurative function operates between sets of knowledge, and between sets and the inexplicable for that person at that point in time. The figurative (or metaphoric) function does not deduce necessary knowledge, but creates new knowledge, knowledge which does not follow in any strict logical way from what is known. The metaphoric *generates* new knowledge in the same manner that the psychologist George Killer speaks of language being generated from
imagination and the complete set of grammatic rules. The set of rules decides whether or the imaginative operation is permissible in both the linguistic and reality sense. It is only by the construct of figurative operativity that generation can be sufficiently accounted for; that is, what we call revolutions in thought”. As theories of conditioning cannot sufficiently account for the production of the new in the sense that it has been used in this paper, neither can logic itself. **Metaphor takes thought where logic cannot go.**

Let me try to illustrate the points I have been trying to make with two examples, the first dealing with the difference between literal and figurative functioning and the second dealing with figurative operativity.

A few weeks ago I planted some flower seeds with the help of a child of about eight from next door. The seeds failed to sprout. The child inquired as to what the problem was. I replied, "Perhaps we planted the seeds upside down and the flowers are growing the wrong way." The child shook its head in knowing agreement and responded, "We better be careful the next time," My answer was a perfect example of literal thought at the concrete operational stage. The child accepts my answer as being true because it was logically consistent and plausible: which is one of the problems of logical explanations that are not verified back against reality. As the child's operativity was entirely in the realm of the literal, he could not grasp my joke, my figural thought (or my impish meanness or the social content of our exchange). Although I did not pursue my experiment at the time to find out, I doubt if this child has any trouble dealing with events which entail his grasping symbolism, the preoperational figurative counterpart of concrete thought. From the results of Piaget's research, he should not have. The point here is that as this child, from Piaget's findings, would have trouble dealing with events which necessitate logical operativity, he should not have trouble dealing with events which necessitate metaphoric operativity, according to Piaget’s views,
definition and theory. But this child did and children do and that is a simple and basic empirical fact. The figurative, therefore, is not something that is confined in the form of symbolism to the preoperational stage as Piaget would like us to believe. As with the literal, the figurative also develops an (increasing sophisticated) operativity which we call the metaphoric as opposed to the logical. The figurative and the literal are in parallel development.

What are the results in terms of development and functioning if the harmony of these parallel operativities is disturbed? It is here that the Piagetian concept of equilibration becomes crucially important for the implications that emerge from a re-conceptualization of the figurative as having an operativity, and these implications are fascinating to say the least in terms of individual differences, developmental theory, and education. Although Piaget did make a conceptual mistake in his formulation of the figurative, he did observe a dominance in children at the operative stage of literal thinking over figurative. The obvious question is what accounts for the arrested development of figurative functioning in children. Where does this domination of the literal over the figurative come from and how does it emerged? Since Guilford's address before the APA in 1950, there has been a deluge of research on these questions under the name of "creativity." Literary and language scholars have been inquiring into the same questions for a good century now. The research has turned up two major points. The first is that our most innovative people in both art and science have highly developed figurative as well as literal operativity, whereas the less innovative have only highly developed literal operativity. The second point is that much of arrested figural operatativity can be attributed to cultural factors, value dominance (and thus conditioning), and mode of education. There has been a growing clamor in the past two decades that the development of logical thinking is not and will not sufficiently solve the problems we face. Unlike many others interested in
the area, this writer does not think that figural operativity is any more of a special talent than logical operativity. Further, when it comes to placing bets, this writer will place his with Piaget's epistemological method coupled with empirical validation and revised Piagetian-type models of intelligent functioning. It has not escaped this writer that his identification of Piaget's conceptual mistake concerning the figurative function (and all that he has said subsequent to that) came from the employment of Piaget's own epistemological method. The purpose of this paragraph was to offer some potential paths of inquiry which flow from a re-conceptualization of the figurative function. I would like now to pose the second example I promised before which seeks to illustrate the nature of metaphor!c operativity.

The description of figurative activity is not an easy task for two reasons. The first is that as operativity is dynamic rather than static, it is difficult to precisely describe. The second is that unlike logic the dynamics or process of metaphor operations have not been worked out in any but the most rudimentary fashion. Much of the present work by researchers into creativity, computer scientists, and even logicians is devoted to this question of unraveling the dynamics of metaphoric operations. In all fairness it must also be pointed out that even Piaget in his most recent work has returned to reinvestigate both language and preoperational thought because he has discovered a "pre-logic or a-logic of functions" of which he was previously unaware. Piaget's motivation to re-investigation grew out of Sinclair's findings that children who reached a higher operative stage in thinking used
higher-order linguistical devices (i.e., simile and metaphor) than those who did not. Given this prefacing, I will now pose my illustration of figurative operativity for it speaks not only to the above mentioned questions, but also to those of the generation of new knowledge which is outside the set of necessary knowledge.

One day a few months ago I was asked by a friend to give a unique use for a paper clip. Without much pause I responded, "You could use it as suturing for robots." My friend thought about it for a while and then replied, "Why stitch metals together when all you have to do is join them electrochemically with heat or an adhesive; besides, metals aren't stitched together." My friend was trying to explain to me that my novel use was not only alogical but didn't bear up under the scrutiny of physical theory. The crucial point here is that my unique use cannot be termed a symbol in the Piagetian sense. Paper clips do not represent or symbolize "suturing for robots." I have performed an operation upon the object of the paperclip and transformed both its literal and symbolic content into a metaphor. At the very least, to stay within the Piagetian framework in this example, one would have to predicate an interaction of symbols, a construct which of itself implies operativity. But it is this very "interaction of symbols" that is the beginning and constitution of metaphoric operativity. Although symbolism is a necessary first step to the second of metaphoric operativity, it is not a sufficient construct by itself to account for the transformation. Neither is the construct of "symbolic logic." In Piagetian terms, I had assimilated and accommodated schemes, but, as my friend point out, I had not fully accommodated and adapted my resultant product to reality. My metaphor seemed lacking and I put it out of my head.

A few week later, I happened to be chatting with a friend who does research in physical chemistry. I told him about my "suturing for robots." He said to me, you know, that not so far fetched. Some of the
evidence we’ve been gathering suggests that at the molecular level metals sort of stitch themselves together. The energy from the heat tangles up molecules at the surface interface and the metal are sort of stitched as well as electromechanically bound. We’re doing some rethinking.”

There are several points of importance in the recounting above. The first is that my metaphor lay outside the set of necessary knowledge as it was originally constituted. The second refers back to George Miller’s view of generative language which is a “souped up” version of Chomsky. My generative product was judged impermissible by the governing set of rules unchecked back against the reality (verifiable facts) of the phenomenon. It is in this interaction that we see why logic or empiricism alone is enough to determine validity. Both are needed in a cross-verifying relationship, and even then there still exists the possibility of beta error. The next point is crucial. The theory (a given reality state) was not as valid as my metaphor. It was not that my metaphor was so much in need of accommodation to theory, as that theory was in need of accommodation to my metaphor. The paramount distinction that must be kept in mind at this point is the different between ‘reality” (the verifiable facts of a phenomenon) and the term ‘reality state” (the construction of a phenomenon as theory). Al theory is a mixture of the literal and the figurative, of fact and construction. As such, theory is both logical and metaphorical. The exception here may be certain mathematical theory and certain theories that are expressed exclusively in mathematical terms, but this would have to be shown on a case by case basis, as every theory no matter how expressed has a “semantic” component that maps it to real world phenomena and it is in this mapping and this component that the metaphorical terms may reside.

Given then that most theory is a mixture of the literal and the figurative, it is fairly well documented among teachers of science and psychiatrists that problems arise when people try to treat the figurative literally and the metaphoric logically. My example of "downward growing
flowers and seeds planted proper-side up" is illustrative of such functioning. When one speaks of "adaptation to reality," what one means is adaptation to the **prevailing construction of reality** that is being utilized as judgmental criteria for assessing one's assimilation and accommodation. These judgmental criteria for assessing the validity of one's adaptations are the accepted theories of one's time, the prevailing construction of reality. As theory is a construction, a mixture of the literal and the figurative, it is also capable of error, of judging permissible products as impermissible. This is the problem of using logic or logical thought alone to determine validity: at best you can only get a measure of internal consistency. Logic is built upon the assumption that there is no figurative; that there is only the literal. As theory cannot satisfy this assumption, and as theory in conjunction with the laws of logic are the criteria of valid adaptation, we see:

1. the problems with Piaget's construct of valid adaptation through logical operativity alone;
2. the necessity for a construct of metaphoric operativity;
3. the reason why logic can only deduce necessary or literal knowledge from theory; and,
4. how the production of new knowledge comes from metaphoric operativity,

There are many examples where the criteria for assessing valid adaptations have stood in need of revision.

Such a situation is when an Einstein doesn't find stars where Newton's theory said they should be and develops the metaphor “elastic time” to try to account for the facts of the phenomenon (reality). Through verification back against the phenomenon itself, Einstein validated his metaphor. His metaphor revised theory and introduced new knowledge into the set of existing knowledge. This new knowledge could not be logically obtained from the constitution of the set as it was.
When one assumes the invariance of theory, that is, the invariance of criteria for assessing valid adaptation, one is caught in the bind of being unable to sufficiently account for new knowledge, invention, language, insight, drama, art, and poetry — the reconstruction of the set itself. Piaget's model is "built upon such an invariance assumption. If one accepts the variance of theory, then one is hard pressed to account either for this variance or new knowledge unless one predicates a metaphoric operativity, which by definition is the creation of “excess (i.e., new) meaning.”

This paper has been an argument for the necessity of a construct of metaphoric operativity. Furth comments:

Notice how Piaget's theory is turned into a travesty if symbols can do what operative constructs accomplish only by devious ways.
Furth goes on to elucidate many of the problems Piaget has in sufficiently accounting for what Furth terms "true symbolic behavior." His argument concludes that conditioning (signal theory) is even weaker than Piaget in accounting for the operativity involved in "true symbolic behavior." As Furth has made the same conceptual mistake as Piaget, he does not realize that a construct of figurative operativity - i.e., metaphor - resolves the dilemma. Such a construct does not turn Piaget's model into a travesty, but rather gives it a strength, power, and depth that makes it all the stronger. For example, recall my example of "downward growing flowers." If the Piagetian model had a construct of figurative operativity, this example would be illustrative of a disequilibrium between logical and metaphoric functioning. In this case the logical dominates the metaphoric, but the reverse is also possible as we know the study of psychotics and such illusion as phystogen being the substance that made thing burn.

Implicitly Piaget almost broaches the possibility of such a dynamic in Play, Dreams and Imitation in Childhood through his notion of "primacy." Piaget saw in the imitative behavior of children a primacy of the literal. Children literally reproduced (imitated) a behavior, custom, or the dialectical pronunciation of a word without adapting it at all. In The Moral development of Children, Piaget noted well how literally children applied rules and obeyed laws. Continually in his protocols, he would suggest possible figurative interpretations to very young children, as well as the possibility of inventing new rules, but they resisted his inducements. Conversely, Piaget observed in children’s behaviors of the pure fantasy type that there was no accommodation to the literal and little adaptation to reality. He termed this behavior "the primacy of assimilation over accommodation."
Out of this behavior, Piaget traced the evolution of symbols, but he really stopped there. Due to his conceptual mistake, he really could not carry on from that point without radically altering and re-conceptualizing his theory. From his previous work, he knew that assimilation and accommodation equilibrated, so he concentrated on tracing and recounting the evolution of logical operativity. He tied the development of symbolic function to the development of affective schemas, but again stopped his investigation of his line of thinking and inquiry because he got bogged down in refuting the theories of Freud, Adler, Jung and many others. These refutations are nothing short of brilliant, which is perhaps why he got bogged down in them, but he never carried his thinking or inquiry beyond the symbolic to the metaphoric in this or any subsequent work. And there is a reason why this very important line of inquiring and thinking stalled out for Piaget I believe.

It is rather obvious that a child in the egocentric stage of development can only manage to invent what is essentially a one character drama. Most beginning playwrights cannot manage much better as any writing teacher or literary critic will attest. But it is equally obvious that when a child is out of the egocentric stage and begins inventing dramas with many different and fully drawn characters in them that the play (double entendre intended) is no longer symbolic and is metaphor: fully operating figurative thought in which premises, problems, and hypotheses get work out. Additionally, as it has become increasingly more evident in the past century that constructive fantasy anticipates reality, it is going to be exceedingly difficult to demonstrate to this writer that fantasy is only symbolic with no operativity to it rather than metaphoric and operative.

In the construct of a metaphoric operativity, one sees a capability
for accounting for and coming to understand how the cognitive and affective combine as well as interact, and, therefore, or having a fuller, more complete, and rich model and theory of human behavior and functioning. As has been said previously, metaphor combines together in its transformations both the literal and the figurative in a workable and meaningful manner. This point is simply to say in Piagetian terms that it adapts symbolic schemes (affective and alogical) to cognitive schemes (factual and logical) and vice-versa. This writer has argued as to why he believes that a construct of metaphoric operativity is necessary to the Piagetian model, as well as why it is a construct that cannot be simply excluded or ignored by the model without serious and far reaching problems and difficulties. It is through such a construct that the process of thought as well as invention in art and science become fundamentally one with different weighting of the two components in different contexts. Guilford's notion of convergent and divergent thinkers is not as sufficient to this writer as a revised Piagetian notion of a primacy of literal operativity, a primacy of figurative operativity, and a state of equilibration where both operativities are operating at full development.

When one looks at Sinclair findings on the development of figurative language and those of Piaget on the development of logic, the interesting hypothesis is suggested that the impetus to the growth of thought in either the literal or figurative domains stems from a dialectical interplay of and a disequilibrium between the two. Thought quite often anticipates affect, but affect also quite often anticipates thought. It was felt by this writer that a meaningful close discussion of Piaget’s PPIC could not have been possibly done without the stating
of this writer's major conclusions first: that is, the matter of the
category mistake, and the necessity of a construct of metaphoric
operativity. These two points are so crucial to what there is to be
said by this writer about this work of Piaget's that it was felt that
it would be impossible to carry on discussion without first elucidating
the point of view that was' being' brought to bear on the subject matter
under review. A rather telling quote from Piaget's short autobiography
in *Men of Science* expresses his subtle understanding of how evaluations of
his seminal works (PDIC) must be structured in terms of the
conceptualization they use and towards where they are pointing rather
than in terms of the ground they were digging up:

Consequently the results of these first works were
limited and simply served to pose problems that were new
at the time.

It is hoped, then, that this expressed need of Piaget’s to extend the
limits of his seminal work is met in this article, and that a more
meaningful close discussion of cognitive operativities and their
functionings and development can proceed from this new frame of
reference.
1. The excessively long title of this work will be abbreviated as PDIC in this paper.


3. Piaget has made a number of conceptual mistakes concerning the figurative and symbols. The first is the one I have just pointed out in conceptualizing the figurative as being composed of one category instead of two. It is to this mistake that I will confine myself in the first part of this paper. Piaget's other conceptual mistakes are within his theory of symbols itself, where he does not take into account that what he terms a signal can also be direction for the performance of an operational act, such as the signal "add these numbers." Signals have an operative dimension as well as a symbolic dimension. These mistakes will be discussed in the second part of the paper.

4. I find this same point to be a problem in Piaget's own research methodology, and many of the inferences and conclusions he draws from his observations! they do not verify back against reality very well*

5. Furth. Ibid., p. 97.

6. Furth. Ibid., p.113.

7. Furth. Ibid., p. 93.