INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in "sectioning" the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from "photographs" if essential to the understanding of the dissertation. Silver prints of "photographs" may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

University Microfilms International
300 North Zeeb Road
Ann Arbor, Michigan 48106 USA
St. John's Road, Tyler's Green
High Wycombe, Bucks, England HP10 8HR

OBJECT PERMANENCE DEVELOPMENT IN INFANCY: EFFECTS OF NEED STATES, NEED-GRATIFYING OBJECTS, AND COGNITIVE STAGES

by

SALLY ROSENZWEIG MOSKOWITZ

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1978

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

4/26/78
date

Gilbert Voyat Ph D
Chairman of Examining Committee

May 12, 1978
date

Florence L. Denmark
Executive Officer

Gilbert Voyat, Ph.D.
Louis Gerstman, Ph.D.
Steven Ellman, Ph.D.
Supervisory Committee

The City University of New York

ACKNOWLEDGEMENTS

There are several people who helped make working on this thesis an exciting and rewarding experience. With their guidance and friendship, this sometimes tedious, seemingly endless project turned out also to be interesting, fun, and most of all finished.

I would like to thank Dr. Gilbert Voyat, my mentor, for his inspiration through the many years he has taught me. I would also like to thank Dr. Dorothy Gartner, my supervisor at Downstate Medical Center, who besides being always enthusiastic, was an island of calm and rationality during this process. In addition, I want to thank Dr. Michael Moskowitz, my husband, for helping me realize long before and all the way through that this was possible.

Finally, I am grateful to Dr. Louis Gershman for his kindness and valuable help with statistics, and to Drs. Steven Ellman and Karen Bander for their help with the design. The presence and thoughtful comments of Mrs. Anni Bergman and Dr. I. H. Paul at my defense helped make the orals a nice way to end. Last, thanks to my family and also to friends and colleagues for many hours of lively discussion all of which contributed to the formulation of thoughts presented in this dissertation.

TABLE OF CONTENTS

LIST OF TABLES vii

LIST OF FIGURES viii

Chapter

I: INTRODUCTION 1

Object Permanence 5
Object Permanence and Experimental Validation of Stages 28
Object Constancy 32
Relevant Experimental Studies 43
Hypotheses 48

II: METHOD 50

Subjects 50
Measures 51
Procedure 55

III: RESULTS 60

Main Effects 60
Interaction Effects 67
Additional Findings 73

IV: DISCUSSION 76

State 76
Stage and Object Interaction: Characteristics of Stages 80
Continuity of Stages 90
A Reexamination of Bell's 1970 Study 94
Discussion of Additional Findings 97

* * *

TABLE OF CONTENTS
continued

BIBLIOGRAPHY 99

APPENDICES:

A: ESCALONA-CORMAN OBJECT PERMANENCE SCALE SCORING SHEET 105

B: EXTENSION OF OBJECT PERMANENCE SCALE . . . 111

C: INTERVIEW DATA 113

D: LETTER SENT TO INFANTS' MOTHERS 114

LIST OF TABLES

Table

1: Analysis of Variance 61

2: Infants' Mean Scores with Different Objects while in Different States (n = 24) 64

3: Stages III, IV, and V Infants' Mean Scores while in Different States (n = 24) 64

4: Mean Scores and Standard Deviations for Objects & t-Values for Differences between Objects (n = 24) . . 65

5: Means and Standard Deviations for Groups & t-Values for Differences Between Groups on Each Test Object 69

6: t-Values for Differences Between Objects in in Different Stages 72

LIST OF FIGURES

Figure

1: Mean scores in hungry and alert states. (n=24) 62

2: Mean scores for different objects. (Hungry and alert data are merged; n=24) 66

3: Mean scores for different stages. (n=24) 68

4: Mean scores for different objects in different cognitive stages. 71

5: Object permanence scores illustrating continuity of stages. 93

I.

INTRODUCTION

Recently much attention has been given to possible interrelationships between Piagetian and psychoanalytic theories of infant development. For both theories, an essential issue in need of clarification has been the process by which the infant comes to distinguish self from non-self. Both theories assume the infant's initial conception and experience of the world is one in which self and other are not differentiated. Piaget describes a world of "pictures . . . which disappear and reappear capriciously," things existing only insofar as they are acted upon by the infant. In his view, infant action and object are one and only through complex development become distinguishable by the infant. Psychoanalytic theorists also postulate and initial phase of undifferentiation. Though different aspects of this phase are emphasized by various authors, there is in general, agreement about the existence of a primary phase in which psychic structure, and conscious and unconscious are undifferentiated, and in which the infant is unable to distinguish one thing from another and environment from self (Spitz, 1965). Achievement of self-object differentiation and psychic structuralization is predicated on a complex interaction

between maturational, developmental, environmental, and intrapsychic factors.

Attempts at relating Piagetian and psychoanalytic theories of infancy have often focused on the acquisition of what has come to be called the "object concept." This term has been used variously to refer to the Piagetian notion of object permanence, to the psychoanalytic notion of object constancy, and currently is most often used to refer to an unspecified sort of composite of both. In its most general sense, and for purposes of this study, object concept refers to the final achievement of the developmental progression of the capacity to internally represent external objects and maintain mental representation of those objects in the absence of some immediate perceptual, motoric, or affective relation to them. More extensive discussion and specific distinctions will be considered in the following sections. For introductory purposes, it is sufficient to only generally state the two views.

Psychoanalytic theory assumes the development of object constancy begins when the first mental representation of the need-gratifying object arises from the infant's state of need in that object's absence. Object constancy is achieved when the infant is able to maintain cathexis of the mental representation of the object not only in its absence but also "irrespective of frustration or satisfaction"

(A. Freud, in Panel Discussion, 1968, p. 506). Increasing differentiation of self and object representations proceeds in this process primarily through recurring cycles of need states, delay of gratification and need gratification. In this view, the infant's relationship to the need-gratifying object is primary. The particular quality or pattern of need-gratification between mother and infant is thought to be the prototype for the infant's understanding of and relation to all else. Thus the infant comes to know the world by way of the process of knowing mother.

Piagetian theory views object permanence as the "product of an extremely complex intellectual" development (Piaget, 1954, p. 5). When it is achieved, infants are able to view objects as existing in their own right, apart from action upon them, in "a universe both stable and external, *[*and*]* relatively distinct from *[*their*]* internal world" (Piaget, 1954, p. 3). Object permanence development proceeds through a dynamic, interactive process between external objects' properties and infants' underlying structures. Increasing elaboration and restructuralization of inborn reflex behavior patterns result from continual activation by, application to, and modification by external objects. In this view, it is the process of ever increasing differentiation that is primary. All external objects come to be known by the infant through the same process, and in this sense, none has

precedence over others. Objects may be more or less important only insofar as their properties are more or less suitable to the infants' developing structures.

Clearly the theories refer to related concepts and much has been written about the particular ways in which they might relate. In theoretical papers, psychoanalytic concepts closely associated with object constancy have been reexamined in light of Piaget's descriptions and formulations of object permanence. Elaborations incorporating Piagetian notions have been suggested for concepts of mental representation formation (Fraiberg, 1969), stages in object relations development (Kaplan, 1972; McDevitt, 1975), and functions of libidinal object constancy (Pine, 1974). Empirical studies, for the most part, have attempted to find direct correspondence between the two concepts by correlating infants' stages of object permanence with stages of object relations development (Decarie, 1965). Attachment behavior (Bell, 1970), stranger anxiety (Paradise and Curcio, 1974; Brossard, 1974), and separation anxiety (Lester et al., 1974) all have been looked at in relation to object permanence development. Results of these studies often have been inconsistent and difficult to interpret, and although some clarification has been offered, much is left to explore.

A major question raised by relating the concepts of object permanence and object constancy is the effect of infants' need states and of objects' need gratifying properties on the mental representations of those objects. These variables are viewed by psychoanalytic theory as essential determinants of the infant's organization and internal representation of reality experiences. Though Piaget (1954) noted that fluctuations in states and the use of different objects sometimes impaired or facilitated infants' performance, he assumed these variables had no significant bearing on the infant's internal representation of the world.

It is the intent of this research to study: (1) the effects of infants' states on levels of mental representation of external objects, (2) the effects of various need gratifying characteristics of external objects on infants' levels of mental representation of those objects, and (3) the effects of the interactions between infants' states and different external objects on the infants' levels of mental representation of those objects. These effects will be studied in infants of different cognitive stages.

Object Permanence

Piaget's descriptions and formulations of object permanence development are grounded in the context of genetic epistemology.

His central interest always is in understanding under what laws knowledge develops and changes (Inhelder, 1962), and his intent is to analyze this passage from states of lesser to more advanced knowledge (Piaget, 1970). As a genetic epistemologist his focus of study is the relationship between "the knower and what is known" both in the history of scientific thinking from its earliest forms to the present, and in the history of individual development from infancy to adulthood. For the infant, object permanence is the "first basic invariant of all knowledge" (Furth, 1969, p. 43). It is the primary achievement of the earliest phase in the process by which the world comes to be known.

Stages of object permanence development are distinct in both their structural and behavioral components and correspond to the six stages of the sensorimotor period. Each stage has a different characteristic organization and preparatory organizations for transition to the following stage. Behavioral patterns relevant to object permanence development are those in relation to absent objects, since the criterion for recognizing objects as distinct from action on them is the advent of behaviors in relation to them when they are not in immediate perceptual presence (Piaget, 1954). In the following, in addition to the structural components of object permanence development, stages in infants' search for vanished objects will be described.

Important Piagetian concepts will be defined as they occur in these descriptions.

Stage I

Development of psychological structures begins with the infant's first use of innate reflexes in relation to the environment. Reflex activities such as sucking, grasping, and vocalizing are triggered by various objects. Once they are used, there is a growing need for their continued use. This is termed "functional" or "reproductive assimilation" and refers specifically to the adaptive mechanism whereby patterns of activity become increasingly stabilized and consolidated through repetition. Piaget states the sequential use of reflexes constitutes "an historical development so that each episode depends on preceding episodes and conditions those that follow" (1952, p. 25). Thus, within the first days of life, the infant sucks spontaneously regardless of his or her state of hunger or the presence or absence of an object to suck.

Functioning of reflex activities in turn brings the infant into contact with various aspects of the environment, and as a result, the patterns of activity are modified by that contact. This modification represents the first aspects of accommodation, which is the adaptive process whereby internal structures are adjusted or modified to "fit"

stimuli and events in the environment. So, for example, when the infant comes in contact with his or her fingers while sucking for the sake of sucking, the pattern of activity is modified to accommodate the fingers.

Reproductive assimilation and accommodation of reflex activities to various objects lead not only to continued consolidation of reflex behaviors but also to the incorporation of an increasing variety of objects into particular patterns of reflex activity. This is termed "generalizing assimilation" and refers to the tendency to assimilate increasingly varied objects to the activity of the reflex. "Thus, according to chance contacts, the child, from the first two weeks of life, sucks his fingers, the fingers extended to him, his pillow, quilt, bedclothes, etc." (Piaget, 1952, p. 35).

In these first weeks, the infant also becomes able to "rediscover" particular reflex patterns and to "select" them from among analogous patterns. This is "recognitory assimilation" and consists of the rudiments of recognition and discrimination. Thus, "when the nursling differentiates between the nipple and the rest of the breast, fingers, or other objects . . . he rediscovers a sensorimotor and particular postural complex (sucking and swallowing combined) among several analogous complexes" (Piaget, 1952, p. 37). Reflex behaviors then, in these processes, become coherent, organized totalities of activities.

Piaget refers to these as "schemas." Thus reproductive assimilation guarantees consolidation and stabilization of schemas; generalizing assimilation guarantees extension and diversification of the schema's domain; and recognitory assimilation assures eventual differentiation within the global schemas into several schemas each with their own sharper and more specific and discriminating focus on reality (Flavell, 1963, p. 57).

Behaviorally, in Stage I, the infant gropes and searches for contact with objects when they are in direct perceptual presence. When they are moved from the infant's perceptual field, there is no special behavior. This stage extends approximately through the end of the first month.

Stage II

The second stage extends from the second to about the fourth or fifth month. It is characterized by structuralization of several new kinds of schemas termed "acquired adaptations" and "primary circular reactions." These represent the infant's development beyond behavior inherent in a particular reflex pattern to behaviors that are created through experience.

Primary circular reactions are behavior patterns that are happened upon by chance and are "recaptured" and re-enacted in a

kind of rhythmic cycle through reproductive assimilation. For example, in the second and third month, the infant will continue to move his or her tongue in and out for some time after external stimulation has ceased and will collect and then swallow the saliva that accumulates in the mouth. This expansion of the reflex behavior beyond its original, fixed limits, and the repetition of the new behavior patterns leading to consolidation is characteristic of the primary circular reaction.

Primary circular reactions develop in all areas of behavior based on reflexes. With regard to sucking, protrusion and movements of the tongue are established. In the area of vision, the infant moves from passive, reflexive responses to visual stimulation, to looking. Crying at this stage ceases to be simply an expression of discomfort and becomes an interesting sound prolonged for its own sake. Similarly, the infant begins to grasp new objects in systematic, frequently performed ways.

During this stage, intercoordinations between different schemas also develop. Activations of primary circular reactions begin to occur by virtue of their coordination to other primary circular reactions and not only in response to direct external stimulation. The intercoordination between the sucking and vision schemas can be seen for example, when the infant opens his or her mouth as soon as the

bottle appears. It is no longer necessary for the bottle to be in direct contact with the mouth in order that the sucking schema be activated. Such intercoordinations occur among all the variously combined schemas: vision and hearing; phonation and hearing; prehension and sucking; prehension and vision, etc.

Finally, in this stage, the intercoordinations of schemas progress a step further through reciprocal assimilation. This refers to the process whereby each schema assimilates the other to form, in addition to the organizations existing within each, a single, supraordinate schema uniting all the elements of the previously distinct totalities. Thus the infant does more than, for example, look while hearing; he or she looks at what is heard and hears what is looked at. Reciprocal assimilation of some schemas occurs earlier than of others, and the end of the second stage occurs when vision and prehension schemas are reciprocally assimilated. At this point, visually guided manual activity is possible.

With regard to development of the object concept, reciprocal assimilation of schemas confers on objects a degree of exteriorization and objectivity. The object is no longer so directly related to an action of the infant. For example, the bottle no longer simply exists only when it is sucked, but also exists when looked at and grasped. Furthermore, it exists at the intersection of several schemas. The infant

grasps it as it is seen and sucked, sees it as it is grasped and sucked, and sucks it as it is seen and grasped. The object is assimilated into several schemas simultaneously and "thus acquires an ensemble of meanings and consequently a consistency" (Piaget, 1952, p. 121) which could not have existed when it was simply aliment for a function and conceived of as identical to that function. In other words, the bottle becomes something that is "graspable," "suckable" and "seeable" and these properties become properties more of the object than of the action on the object. During this stage however, this exterioration is only minimal. The object is still largely subordinate to the activity in that it is still the support for the activity. The object is considered permanent only to the extent that it prolongs or thwarts action upon it. Thus behaviorally, what is observed with regard to the object is that the infant responds to an object only as long as it is immediately available to one or more of the coordinated schemas. If the object disappears from the infant's sphere of action, the infant will simply repeat earlier accommodations in an attempt to rediscover the object. So for example, the infant will look at the place where the object disappeared, or cry randomly. Thus, though the object is more exteriorized when present, its existence is still directly related to the activities of the infant and action on the object is entirely determined by directly perceived sensorial images.

Stage III

This stage begins around the fourth or fifth month and extends to the eighth or ninth. It is characterized by the advent of "secondary circular reactions" and "procedures for making interesting sights last." The use of these schemas reflect the beginnings of object permanence.

Secondary circular reactions directly stem from the reciprocal assimilation of vision and prehension. They consist of essentially the prolongation of the primary circular reaction but in connection with the external environment rather than the infant's own body. That is, the infant's activities are now centered on an external event and on the prolongation or reproduction of that event. For example, the infant, while sucking an object he or she is looking at and looking at the object he or she is sucking (primary circular reaction), unwittingly produces a noise by knocking the object against the crib. When the infant looks at the object he or she is knocking against the other object producing the noise, a secondary circular reaction has been achieved. The infant's interest is in the external result, the noise, and in prolonging the noise. Thus interest is in the attempt to rediscover the movements which led to the external result. This accommodation gives rise to a new schema which is consolidated through reproductive assimilation once the infant recognizes the

result can be reproduced by particular movements. Subsequently, through generalizing assimilation, the result is produced with other objects and "everything gradually becomes something to be shaken, swung, rubbed, etc., according to differentiations of the manual and visual schemata" (Piaget, 1952, p. 173).

Procedures for making interesting sights last are behavior patterns which consist of the infant's applying secondary circular reaction behaviors to entirely new situations in which the infant played no original part. For example, the infant will attempt to prolong the sight of an object seen swinging in the distance by shaking his or her arm. The secondary circular reactions, in this way, become removed from the context of particular objects and come to be used as a procedure. This is based on the generalizing assimilation of circular reactions and makes possible their extension into novel situations not initiated by the infant.

The schemas characteristic of this stage reflect several important advances in the development of knowledge in general and in the development of the object concept in particular (Piaget, 1952). They reflect the beginnings of intention, distinction between means and end, foresight and permanence of objects. Though intentionality comes into play only after the behavior begins, and the event becomes the goal or end only after the means have been put into effect, it is the

first time these aspects are distinguished from one another. Piaget states the secondary circular reaction heralds the first real exploration of the world (1952).

With regard to the object, the secondary circular reaction gives rise to a further exteriorization. Objects now, in addition to existing at the intersection of several schemas, also have various properties (swingability, etc.) that the infant can reproduce by certain movements. Each new property discovered increases the infant's awareness of the distinction between action and the result of action.

Five specific behavior patterns in relation to vanished objects have been discerned. They are characterized as intermediate between the "mere perceived image and the concept of permanent object" (Piaget, 1954, p. 14). In each of the patterns, the infant attempts to reproduce a disappeared object by prolonging the activities performed in relation to it and also extending them in some way. In each pattern, the infant's focus is on the reproduction of the external event, not on reproduction simply of the action. The patterns are as follows:

1. Visual accommodation to rapid movements. This consists of the infant's ability to look for an object which has disappeared in a place other than where it was last seen. If an object is dropped to the ground, for example, the infant is able to reproduce the object's

trajectory with his or her own movements, and to find the object.

2. Interrupted prehension. The infant will try to grasp an object that has been moved from the perceptual field.

3. Deferred circular reactions. These refer to the prolongation of circular reactions after interruption. If an activity is interrupted, the infant is able to resume the behavior pattern shortly afterwards without any additional external stimulus.

4. Reconstruction of an invisible whole from a visible fraction. By this, it is meant that the infant is able to respond to a part of an object as if it were the whole. The part is sufficient for the infant to "believe in the [object's] material existence" (p. 32), and to evoke the behavior pattern used in relation to the whole object.

5. Removal of obstacles preventing perception. The infant is at times able to remove a barrier that obstructs view of an object, but in this behavior is attempting more to free his or her own perception than to free the object.

In sum, during this stage, there are several advances in the development of exteriorization and objectivation of objects. There is a shift from interest in actions to interest in external objects and events, and with this, the object's existence becomes less tied to the infant's immediate perception. However, object and action still remain linked as parts of a single experience. Piaget writes:

> The child's universe is still only a totality of pictures emerging from nothingness at the moment of the action, to return to nothingness at the moment when the action is finished. There is added to it only the circumstance that the images subsist longer than before, because the child tries to make these actions last longer than in the past; in extending them either he rediscovers the vanished images or else he supposes them to be at disposal in the very situation in which the act in progress began. (1954, p. 43).

Stage IV

This stage begins in the eighth or ninth month and continues through the twelfth or thirteenth. The foremost achievement of this stage is the intercoordination of the secondary schemas through reciprocal assimilation. In this stage, the reciprocal assimilation is quite complex. Earlier when primary schemas were reciprocally assimilated, only one external object was involved. An object was looked at while grasped and grasped while looked at. Now, because several objects are involved, the process of formation of a superordinate structure must "surpass simple fusion" and construct a series of more complicated relationships. The resulting structures are "the first actually intelligent behavior patterns" (1952, p. 210). They mark the beginnings of elaboration of the "real" categories of intelligence: object, space, causality, and time. Infants now begin to be able to view objects in relation to and as distinct from one another and from actions and to view events as having temporal sequence and spatial reality. Means and

ends, and cause and effect in events become more clearly distinguished from each other.

There are three behavior patterns characteristic of this stage, each involving the coordination of secondary schemas and their application to new situations: "simple coordination of secondary schemas"; "removal of obstacles"; and "finding intermediates between subject and the objective."

Simple coordination of secondary schemas is intermediate between secondary circular reactions and the true application of familiar means to new situations. These behavior patterns involve the utilization of a familiar schema with a new intention in a familiar situation. So for example, an infant trying to grasp a desired object (which is ungraspable in its usual way) attains it by using a grasping schema previously applied to a different object.

Removal of obstacles refers to a group of behavior patterns characteristic of this stage seen in relation to vanished objects. The final pattern of the group is the infant's ability to search under a screen for an object that has been placed there and that is thus out of the infant's perceptual field. In these behaviors, "lifting the screen" has become a schema subordinate to, and coordinated with the schema "grasping the object." These behaviors will be discussed in more detail below.

Finding intermediates between subject and the objective consists of behaviors in which the infant intends an action, is unable to attain that goal, searches for a familiar means which might be capable of being subordinated to that end, and applies the schema to achieve the end. For example, "kicking the foot" is chosen from among the many schemas to be used to bring an object into reach that is too far to grasp with the hands, and then the object is grasped.

Several additional points are important to note in this stage as transitional to and preparatory for Stage V. In this stage, prevision first becomes independent of action. With means and ends distinguished, the infant is able to foresee not only events connected with action, but also to foresee events which are conceived of as connected with the activities of objects (Piaget, 1952). For example, when the infant cries when a person turns to leave the room, the infant is anticipating an event viewed as connected with the person. In this stage, there is also the beginning of "exploration of new objects." When a new object is encountered, the infant tries to fit that object into each existing schema. The object is held, turned over, rubbed, squeezed, let go, etc. The child tries to understand the nature of the new object and, in this way, the object is the goal and the behaviors of comprehension are the means. In addition, there is the appearance of "derived secondary reactions." The infant's explorations, by chance, often

result in the discovery of new secondary reactions which through repetition and elaboration, become totalities of behavior in and of themselves.

With regard to object permanence, four steps in the infant's behavior towards hidden objects can be discerned:

1. As described above, the infant is able to find an object that is hidden behind a single barrier by raising or removing the barrier, but will only do so if the action of grasping is already underway while the object is being placed.

2. The infant is able to find the hidden object behind a single barrier regardless of prior action upon that object. However, if the object, in view of the infant, is then hidden in another place, the infant will search for the object at its original hiding place. Similarly, if the object is first hidden at the second hiding place, the infant will search for it behind the original barrier.

3. The infant is able to search for the object at the second hiding place without first looking behind the original barrier. However, if the infant encounters difficulty in finding it there, he or she will return to look behind the original barrier. Similarly, if the object is then hidden behind a third barrier, in the infant's view, the infant will look for it either in the first or second hiding place and not in the third.

The infant's ability to search for the object even when it is

outside the perceptual field stems from the fact that the infant is beginning to "study" displacement of objects -- by shaking them, grasping them, swinging them, hiding them and finding them, etc. In this way, visual permanence is beginning to become coordinated with tactile permanence (Piaget, 1954). The infant is now able to search with his or her hand for an object that has been seen. At this stage, however, object permanence is still limited by the conditions in which the object is sought. The object is conceived of in a special position, the place where the action of finding is successful, and it is part of the total picture, "ball-under-pillow," "ball-under-rug." Though it is recognized and endowed with permanence in each of the contexts, it is not abstracted from them and thus cannot be considered independent of them. Piaget states:

> During this fourth stage, the object remains a practical object rather than a substantial thing. . . . *[It]* is not a thing which is displaced and is independent of those displacements; it is a reality at disposal in a certain context, itself related to a certain action. . . . *[The]* object remains dependent on its context and not isolated in the capacity of a moving body endowed with permanence. . . . It remains in the extension of the effort and of the feeling of efficacy linked with the action by which the subject finds the object again. . . . In order that these things really become objects, . . . the child will have to understand the "how" of the appearance and disappearance of the objects and thus will have to abandon belief in the possibility of their mysterious reappearance at the place they have left and where action itself has discovered them. (1954, pp. 65-66)

Stage V

This stage begins at the end of the first year and extends to about eighteen months. It is characterized structurally by the formation of "tertiary circular reactions" and behaviorally by "the discovery of new means through active experimentation." The achievement of the differentiation between accommodation and assimilation accomplished through the discovery that certain properties of objects cannot be reduced to existing schemas, directs the child's interest to those unforeseen, new properties. Accommodation predominates and the child's interest in and efforts to grasp novelties becomes paramount.

The tertiary circular reaction derives directly from the explorations and secondary reactions of the former stage. When a new effect is obtained by chance, the child now not only repeats it, but also modifies it in all possible ways so as to discover variations in the results. It is a sort of "experiment" to discover in which respects the object or event is new. So for example, whereas in Stage IV, the child's interest with regard to the schema of "letting go" was in the act, now interest is directed towards the object's motions and the phenomenon of falling. The tertiary circular reaction occurs when the child gradates little by little, his or her behaviors in order to observe the various ways in which the object can fall. So, the child will let go of the object again and again from

different altitudes, or by trying different finger positions, the essential points being the discovery, analysis, and understanding of the novel properties of the object and the event.

Discovery of new means through active experimentation refers to new behavior patterns invented by the child in order to attain goals which cannot be attained through use of familiar schemas. The intermediates of the previous stage are understood now as "means for bringing" regardless of the objects being brought. In this way, schemas of using a stick, leg, or string, for example, in order to reach an object, can be evoked on the way towards attempting to attain that object and "inventive intelligence" has thus begun.

Object permanence in this stage progresses to the successful discovery of an object hidden behind a barrier after it has been hidden and discovered behind a first barrier. The child no longer searches at the first point even if difficulty in finding the object was encountered at the second. Thus, the child is now able to dissociate the object from its practical context by taking into account all the observed displacements of the object. Three behaviors in relation to vanished objects are characteristic:

1. Early in this stage, the child searches for the object hidden behind a second screen even if the object was first hidden and found behind another barrier. The child is also able to do this successfully

when a third barrier is introduced, but with each of these, all displacements of the object must be done in the child's view.

2. The child is able to find an object that has been hidden with one invisible displacement. That is, if an object is hidden behind a screen and then the object and screen are hidden behind a second screen and the object is left there while the first screen is removed, the child eventually learns to look for the object behind the second rather than the first screen.

3. When a third screen is introduced and invisible displacements made, the child reverts to looking for the object behind the first screen.

From these behaviors, it is deduced that the nature of the object at this stage is twofold. Although it is conceived as permanent when visible displacements are made, it still remains dependent on its context and on the practical schema of which it is a part when there are invisible displacements (Piaget, 1954). In terms of mental representation of the object, progress has been made in prevision. Practical anticipations based on generalizations of earlier experiences account for the child's being able to find the objects in these situations. But representation of the object does not truly precede action, nor does it even directly result from it (Piaget, 1952). Representation is not yet freed from perception and events occur

"as though the object seen were conceived as being identical to that which it appears to be in immediate perception" (Piaget, 1952, p. 326). There is not yet a true awareness of the relations involved in the displacements nor an image of these displacements occuring behind the screens. There is only the application of earlier behavior patterns and the progressive comprehension of the situations. "Constitution of the object first consists in detaching it from oneself. . . . One must place oneself among . . . objects and, in order thus to come out of one's own perspective one must elaborate a system of spatial, causal, and objective relations" (Piaget, 1952, pp. 326-327).

Stage VI

The last stage of the sensorimotor period takes place during the middle of the second year. Two interdependent developments during this stage distinguish it from all earlier stages and mark the advent of systematic thought. These are the "invention of new means through mental combinations" and "representation." Only in this stage is awareness of relationships sufficiently advanced so as to permit solutions to problems to be found solely through mental activity.

Inventions of new means through mental combinations derive from the directed gropings, discoveries, and experimentations of the previous stages. They are behavior patterns in which the child, in a

situation requiring unforeseen and particular activities in order to attain a goal, discovers the means mentally through invention. However,

> Instead of [the behavior] being controlled at each of the stages and a posteriori by the facts themselves, the searching is controlled a priori by mental combination. Before trying them, the child foresees which maneuvers will fail and which will succeed. . . . Moreover, the procedure conceived as being capable of succeeding is in itself new. . . [and] results from an original mental combination and not from a combination of movements actually executed at each stage of the operation. (Piaget, 1952, pp. 340-341)

So, for example, the child who has not encountered the stick's use as an intermediary during the previous stage, will in this stage invent that procedure through mental combinations of schemas relating to the stick, the desired object, grasping, etc.

Representation is the mental functioning of the previously developed schemas independent of the external objects or events to which they refer. The child can now represent data offered to his or her sight in ways other than in which they are directly perceived (Piaget, 1952). Thus, the stick in a certain position beside the child or out of the child's perception, can be represented in the child's mind in various positions one of which may be suitable to its use in obtaining a desired object that is otherwise out of the child's reach.

These two aspects of systematic intelligence are interdependent. "To invent is to combine mental, that is to say, representative, schemata and, in order to become mental the sensorimotor schemata must be capable of intercombining in every way, that is to say, of being able to give rise to true inventions" (Piaget, 1952, p. 341). The transition from gropings and earlier schemas to this stage occurs through the process of recirpocal assimilation. The schemas of "holding a stick in a certain position," "using one object to obtain another," and "grasping a desired object" for example, through reciprocal assimilation result in the child's ability to represent the necessary displacements, mentally combine the various elements, and imagine the sequence of actions that he or she must perform in order to obtain a desired object.

With regard to object permanence development, the problems encountered earlier with the vanished object are solved through representation and invention. The child is now able to search for and find an object hidden behind the third of a series of screens after it has been hidden and found behind two others. Invisible displacements no longer cause errors because the child's search is directed by representation of those displacements. Piaget writes:

> The object is now definitely freed from perception and action alike and obeys entirely autonomous laws

> of displacement. In effect, by virtue of the very fact that it enters the system of abstract or indirect images and relations, the object acquires in the subject's consciousness, a new and final degree of liberty. It is conceived as remaining identical to itself whatever may be its invisible displacements or the complexity of screens which mask it. (1954, p. 84)

The end of this development is, in a sense, a complete reversal from its beginning. Objects and events are no longer "pictures" dependent for their existence on the child's activity. The child is instead, at this point, one among these now permanent objects, all occupying the same solid universe, and subject to the same laws of coordination and relation.

Object Permanence Scales and Experimental Validation of Stages

Based on Piaget's (1954) descriptions of specific behaviors corresponding to stages of cognitive development in infancy, several researchers constructed scales of sensorimotor development (Escalona et al., 1967; Uzgiris and Hunt, 1966; Décarie, 1965; Casati & Lezine, 1968). These all include object permanence subscales. The object permanence scales are similar in that each is made up of a series of steps involving successive visible and invisible displacements of objects. As postulated by Piaget, infants' search behaviors

for the vanished objects are taken as indices of representational ability and as measures of stage or level of cognitive development. The scales differ, however, in the specific theoretical assumptions on which they are based, the intent of their use, and the extent to which the particular steps in each have been subjected to reliability and validity studies.

Décarie (1965) was the first to transform Piaget's observations and informal experiments into operational criteria which could be administered in a standardized way to large numbers of infants and scored objectively. She based her scale on the assumption of distinct stages of object permanence development and chose behavioral criteria to represent the beginning and end of each of the stages. She did not intend to construct a test, and as a result, did not employ rigorous statistical methods and reliability studies. Kopp, Sigman and Parmalee (1974) report on a more rigorously constructed scale developed by Casati and Lézine (1968) and based on theoretical assumptions and infant behaviors stemming from Décarie's work. The Casati and Lézine Scale, however, was constructed using a population of French infants and the English translation has rarely been used.

The Uzgiris-Hunt (1966) and Escalona-Corman (1967) scales were constructed specifically for purposes of widespread use in

comprehensive infant development projects. Their validity and reliability have been demonstrated in large cross-sectional and longitudinal studies using heterogeneous populations of infants in the United States (Corman & Escalona, 1969; Uzgiris, 1973; Uzgiris & Hunt, 1975). They differ in that the Escalona-Corman Object Permanence Scale follows directly from Piaget's postulation of stages, while the Uzgiris-Hunt scale does not. The Escalona-Corman scale includes several behavioral items which, based on Piaget, unequivocally represent each of the stages of object permanence development. The Uzgiris-Hunt scale consists of an ordinarily arranged series of behavioral items, no one of which necessarily clearly represents a particular Piagetian stage.

Results of the many studies of object permanence development are difficult to compare. Researchers have been interested in diverse variables and have not only used the different scales mentioned, but also different methods of sampling, infant ages, populations, testing procedures, and statistical analyses.[1] The following general findings

---

[1]Object permanence has been studied in relation to social class (Golden & Birns, 1968; 1971; Wachs, Uzgiris, & Hunt, 1971), caretaking methods (Decarie, 1965; Paraskevopoulos & Hunt, 1971; Hunt, Paraskevopoulos, Schickendanz, & Uzgiris, 1975), methodological issues (Miller, Cohen, & Hill, 1970; Kramer, Kennedy, & Cohen, 1975), aspects of specific stages (Gratch & Landers, 1971; Landers, 1971;

[continued]

hold true across the different studies and are relevant to the present research:

1. No matter which scale or method is used, the sequence of behavior patterns described by Piaget is found to be invariant. No infant at any age achieves a higher stage or level of performance without having achieved all previous stages or levels.

2. Infant age ranges corresponding to object permanence stages vary widely. In general, infants in the cited studies appear to achieve the last two or three stages at earlier ages than Piaget suggests. In addition, it appears the range of ages of stage achievement is greater in infants from adverse environmental backgrounds than in infants from adequate backgrounds.

3. Results of longitudinal studies (Corman & Escalona, 1969; Kopp, Sigman, & Parmelee, 1974; and Kramer, Kennedy, & Cohen, 1975) show that although no infant performs behavior patterns characteristic of a stage before demonstrating behavior patterns of all earlier stages, the progression is not as straightforward as cross-sectional studies imply. That is, most infants at some time fail to

---

LeCompte & Gratch, 1972; Evans, Wilson, & Gratch, 1972; Gratch, 1975), and aspects of object relations (Decarie, 1965; Bell, 1970; Scarr and Salapatek, 1970; Brossard, 1974; Paradise and Curicio, 1974; Lester et al., 1974).

achieve as high a stage as they had previously. It is not clear to what this may be due.

4. Several researchers note that infants' performance varies according to the particular objects used in the displacement sequences, and the presence and involvement of the infant's mothers. However, since all researchers were interested in infants' highest levels of functioning and not in variations of functioning, different methods of maximizing performance were employed. Researchers sometimes used such objects as food, people, and favorite toys, and have had the mothers administer the tasks and encourage performance. They note these differences sometimes increase the stages or levels achieved.

5. Infants' states are rarely mentioned. When noted, it is usually to emphasize an optimal state of alertness or attentiveness.

Object Constancy

The object concept in psychoanalytic theory is far less clearly defined than in Piaget's theory. Since Hartmann (1952) originated the term object constancy, different writers have elaborated different aspects of the concept, and usage of the term varies in the literature according to the major interests and specific orientations of the

writers. Some describe object constancy as a stage- or age-specific achievement yet vary in placing its attainment from six months to twenty-four months. Others view it as a continuous line of development, specific phases of which can be identified through the course of growth from infancy to adulthood. Several excellent reviews (Décarie, 1965; Fraiberg, 1969; Kaplan, 1972; Burgner & Edgcumbe, 1972; Pine, 1974; and McDevitt, 1975) have helped clarify the concept, but as yet, there is no unified nor agreed upon definition.

For purposes of this review, after presenting Hartmann's formulation, object constancy will be described developmentally, following a sequence based on Mahler's (1963) stages of separation-individuation. Observations and formulations from others will be included within this framework.

Hartmann

In describing various complex interrelationships between components of ego and id developments and object relations, Hartmann (1952) writes:

> [There] is a long way from the object that exists only as long as it is need-satisfying, to that form of satisfactory object relations that includes object constancy . . . This constancy probably presupposes on the side of the ego a certain degree of neutralization of aggressive as well as libidinous energy. (p. 15)

Later, in the same paper, he suggests that object formation "is only one developmental aspect of object relations" which can be viewed and understood from both a cognitive and perceptual perspective as well as from the "angle of the needs involved." He writes:

> 'Object formation' . . . [which the] nonanalytic psychologists have carefully described in their experimental work as the evolving of constant and independent objects in the child's world (as tested for instance in the child's handling of toys, etc.) cannot be fully understood without considering the child's object relations in our sense . . . One may suggest that the element of identity and constancy in what one calls 'objects' in the general sense is partly traceable to the element of constancy gradually developing in what we describe as libidinal or aggressive object cathexis . . . The child learns to recognize 'things' probably only in the process of forming more or less constant object relationships. (pp. 22-23)

Thus, in these passages, Hartmann states that object constancy is a single aspect of object relations that has both ego and id, or cognitive and drive components. He suggests it is an achievement that occurs along a developmental continuum of need gratification which begins with the infant's view of the object as existing only when it provides satisfaction of needs, and ends when the object is conceived of as existing and satisfying regardless of whether need gratification is being provided. In addition, he suggests the infant's conception of inanimate objects directly stems from conceptions of the need-gratifying object, and in a later paper (1953), notes a correspondence

between his and Piaget's concepts. He then speaks of "objectivation" as an "ego contribution to the development of object relations" (p. 188).

Object Constancy Development

The interrelationships between object constancy development and long standing, unclarified issues in psychoanalytic theory involving concepts of ego-id differentiation, ego structuralization, neutralization, fusion and defusion of drives, etc. will not be discussed here. The focus of the following will be on the need-gratification and mental representation components of object constancy within the context of the developing object relationship. Mahler's (1963) framework refers specifically to the development of object relations and her emphasis throughout is on the "primacy of the mother as a love object" (McDevitt, 1975, p. 715). Object constancy development will be described only in the first phases of the separation-individuation process, and not in those phases which extend beyond the sensorimotor period.

The normal autistic phase. According to Mahler, this phase extends from birth to about the second or third month and corresponds roughly to the beginning of what other analytic theorists term the stage of primary narcissism or nondifferentiation or the anaclitic, or objectless stage. During these early months, the infant is thought

to be in a state in which needs and need gratification predominate and need satisfaction is experienced as belonging within the infant's own bodily sphere. It is this relative absence of cathexis of external objects that characterizes this phase (Mahler, Pine, & Bergman, 1975). Hoffer (1955) writes, "The object. . . has . . . no independent existence for the child, [and] is treated as part of the 'milieu interne,' serving satisfaction of the child's inner needs in the same manner in which these needs are served by his own body" (p. 88). The infant does not distinguish among need-gratifying objects and it is possible to vary the objects as long as the form of satisfaction given to the infant remains the same (A. Freud, 1952). During this phase, there are, however, fleeting moments of responsivity to external stimuli, and it is on the basis of these, that the transition to the next phase is made (Mahler, Pine, & Bergman, 1975). Referring to the infant's early sucking and mouthing reflexes, Kris (1951) writes:

> [The] very presence of these earliest pre- and post natal oral activities is . . . taken to indicate that the sensory experience produced satisfies a need not stimulated from outside. However, after the feeding experience has set in the meaning and impact of similar oral activities can only be fully evaluated if we realize that the sensory experience produced by the child himself. . . is likely gradually to be colored at least to some extent by its experience with the mother. (p. 96)

Thus, the infant's experiences and perceptions begin to be filtered through and colored by the relation to the mother.

The symbiotic phase. This phase begins during the second or third month and continues through the fourth or fifth. It corresponds to the beginning of what Décarie (1965) terms the intermediate period, and to Spitz's pre-objectal stage. As a result of the mother's ministrations and the infant's own attempts at tension reduction, the infant begins to differentiate between "pleasurable/good" and "unpleasurable/bad" experiences. There is no distinction made, however, between experiences of gratification achieved through the infant's own activities and those resulting from the mother's caretaking. Anna Freud (1946) writes:

> When . . . under the pressureof urgent bodily needs, as for instance hunger, [the infant] periodically establishes connections with the environment which are withdrawn again after the needs have been satisfied and the tension is relieved. These occasions . . . establish centres of interest to which libidinal energy becomes attached. (p. 124)

This is a crucial step in differentiation. There is a shift in cathexis from the infant's body to the mother-infant unit and there is now a dim awareness of the need-satisfying object (Mahler, Pine, & Bergman, 1975). But the object at this stage is characterized by its "capacity to fulfill the exact requisites of a given need-configuration" (Spitz, 1950, p. 141), and as such, the infant's experience is not

of differentiation, but of a common boundary encompassing the pleasurable/good self and object. Unpleasurable perceptions, whether they result from internal or external stimulation, are experienced as occurring beyond the boundary of the symbiotic milieu (Mahler, Pine, & Bergman, 1975). Gradually, within the framework of the symbiotic unit, demarcations of self-representations take place. An inner core of the body comes to be distinguished from an outer layer or boundary, and these "structures that derive from [the mother-infant unit] represent a framework to which all experiences have to be related before there are clear and whole representations . . . of the self and the object world" (Mahler et al., 1975, p. 47).

The peak of the symbiotic phase and the beginning of the differentiation phase. At about the fifth or sixth month the peak of the symbiotic phase is reached and differentiation begins. This period is also referred to as the stage of object love (A. Freud, 1954), the true objectal period (Décarie, 1965), and the beginning of the libidinal object stage (Spitz, 1965). It is characterized by the establishment of a specific libidinal attachment to the mother which begins to take precedence over all else. The object providing gratification is no longer interchangeable. Rather, it is "possible to vary the satisfactions, provided the object remains the same" (A. Freud, 1952, p. 44). During this age range, the infant displays behaviors toward

the mother which suggest that "a primitive 'recognition memory' of the mother's face and voice has been established" (McDevitt, 1975, p. 717). The infant shows preference for the mother over others, visually follows her as she moves, repeatedly looks at the place she was last seen if she is absent, and shows displeasure at her absence. All writers speak of increasingly structuralized mental representations of "centres of interest," "memory islands," or "islands of consistency" which form the bases for the infant's rudimentary ability to "remember" the need-gratifying object in her absence. At this stage, however, only recognition memory exists (Fraiberg, 1969), and the representation of the mother "is evoked only at those times when the infant is actually perceiving either the mother herself or some sign that represents her" (McDevitt, 1975, p. 721).

The end of the differentiation phase. Structural developments and infant behaviors which most writers have taken to indicate at least the beginnings of the establishment of object constancy occur from about seven to nine or ten months. During this period, there is not only a specific libidinal attachment to the mother, but also a more stable representation of her, achieved through the unification of the "good" and "bad" memory traces (Spitz, 1966). The representation of the mother now has a rudimentary identity and stability.

The infant is able to begin to evoke the memory of her and to maintain object cathexis regardless of frustration or satisfaction or of the mother's absence or presence. However, the representation is not yet stable enough to sustain the infant through prolonged periods of the mother's absence, and the image is still very much tied to the stimulus of need (A. Freud, 1952; Fraiberg, 1969; McDevitt, 1975). Behaviorally, the infant shows that differentiation of self from mother and of mother from others is well underway. This is the period of anxiety reactions to those who are "not-mother." Spitz (1965; 1966) and Escalona (1953) speak of stranger anxiety as indicative of the infant's ability to perceive the mother as independent and capable of being present or absent at will. This is also the period of the appearance of the transitional object (Winnicott, 1953), the infant's first "not-me" possession, an inanimate object that is intermediate between the need gratifying object and objects which are truly external. Mahler, Pine, and Bergman (1975) describe behaviors in relation to the mother while she is present that also suggest the infant's differentiation of self from object. The infant pulls at different parts of the mother's face and body, strains away from her in order to better scan her, puts food into her mouth, etc. They state:

> [The infant] seems to familiarize himself more thoroughly, as it were, with what is mother, what feels, tastes, smells, looks like, and has the 'clang' of mother . . . [As] he learns the 'mother qua mother' (Brody and Axelrad, 1966), he also finds out what belongs and what does not belong to mother's body . . . He starts to discriminate between mother and he or she or it that looks, feels, moves differently from, or similarly to, mother. (p. 56)

Thus, in this view, through comparisons to the libidinal object, the infant begins to know other objects.

The practicing phase. Most writers place the attainment of object constancy at some time during this period from about the tenth month through the sixteenth or eighteenth. Progress in drive neutralization enables the infant's attachment to the mother to outlast deprivation and dissatisfaction (Hartmann, Kris, & Loewenstein, 1946), and further stabilization of the mental representation of the libidinal object occurs. The representation is now not so closely tied to the infant's bodily needs and by the end of this phase, can be evoked in the absence of a specific need stimulus or sign of the object (Fraiberg, 1969). Hoffer (1955) writes, "In the state of 'object constancy' the absent object is still longed for and not rejected (hated) as unsatisfactory" (p. 90). The libidinal object now retains its status regardless of the infant's state of need or the satisfying or non-satisfying properties of the object (A. Freud, 1960). Behaviorally, at the beginning of this period, the infant begins to recognize that there is a relation

between the mother's absence and his or her own experience of distress and the mother begins to be missed. The infant can now anticipate her leaving, and begins to institute behaviors designed to keep her from going, and to get her to return if she has gone. The infant will repeatedly go to the door, call the mother's name, search for her, and express the wish for her return. Mahler, Pine, and Bergman (1975) state that towards the end of this period:

> Libidinal cathexis shifts substantially into the service of the rapidly growing autonomous ego and its functions, and the child seems intoxicated with his own faculties and with the greatness of his own world . . . Now begins a steadily increasing libidinal investment in practicing motor skills and in exploring the expanding environment, both human and inanimate. The chief characteristic of this practicing period is the child's great narcissistic investment in his own functions, his own body, as well as in the objects and objectives of his expanding 'reality.' (p. 71)

Through most writers assume object constancy has occurred by the end of this phase, Mahler, Pine, and Bergman (1975), Pine (1974), and McDevitt (1975) distinguish between the infant's ability to evoke and maintain cathexis of the mental representation of the absent object, and the infant's capacity to sustain and utilize that representation in a "full functional way" (Pine, 1974, p. 308). Mahler, Pine, and Bergman (1975) describe behaviors termed "low-keyedness" during which the infant's motility and gestures slow down and

interest in the surroundings diminish when the mother's absence is noted. It is thought that at these times the infant is concentrating on and attempting to hold onto the image of self-mother unity. The criteria for object constancy for these writers includes a more stable and readily available mental representation of the mother, and more precise self and object representations than exist during this period. They suggest this does not occur until the infant's third year. As the developments leading to this conception of object constancy go well beyond the sensorimotor stage, they will not be discussed here.

Relevant Experimental Studies

Empirical studies relevant to the development of the object concept have generally been based on a view that cognitive and affective developments proceed along separate though perhaps parallel, interrelated, or interdependent courses. The studies have all tended to follow a single paradigm stemming from this view, in which correlations are sought between object permanence stages and behavioral measures thought to represent particular qualitative or structural aspects of object relations development. Results of the studies are difficult to compare as they differ in the object permanence and

object relational measures used. Nevertheless, certain trends and consistencies are apparent.

Décarie's (1965) pioneering study was based on the hypothesis that there were stage by stage parallels between the organization of affect and cognition. She constructed two scales, one based on Piaget's object permanence stages, the other based on behaviors suggested by classical psychoanalytic theorists to be indicative of various structural, dynamic, and energic aspects of the infant's relation to the mother. The Objectal Scale consisted of ten behaviors: (1) a specific reaction to feeding, (2) the appearance of the automatic smile, (3) negative affect at play interruption, (4) ability to wait, (5) the differentiated smile, (6) negative affect at loss of a toy, (7) signs of affection, (8) compliance with requests, (9) compliance with prohibitions, and (10) subtle discrimination of signs of communication. These behaviors were thought to represent a developmental sequence of object relations paralleling the development of object permanence in the cognitive sphere. Ninety subjects from six age groups (3, 6, 9, 12, 16, and 20 months) were chosen from three environmental backgrounds (homes with natural parents, foster homes, and institutions). Décarie found an absence of a rigid sequence on the Objectal Scale for over half the subjects and no significant correlations between those subjects who followed the

hypothesized object relations sequence and age or environment. Her hope of finding a stage by stage parallel was abandoned and detailed qualitative analyses of atypical protocols and patterns of protocols were done. Decarie discussed the issue of mental representation in psychoanalytic and Piagetian theories and, based on the analysis of those protocols that followed the hypothesized sequence, suggested there was a three month difference between the attainment of mental representations of the libidinal object and of inanimate objects.

Bell (1970), following Decarie, sought to test the hypothesis that infants were more advanced in their concept of persons than of inanimate objects, and that there were differences in the rates of development of permanence for people and for inanimate objects. In addition, she expected that infants who were ahead on "person permanence" would be those who had more positive relations with their mothers. Therefore, she tested infants for attachment behavior as well as for person and object permanence. Using 30 infants who were each tested at 8-1/2 and 11 months, she administered an object permanence scale using people and inanimate objects as test objects in the displacement tasks. As expected, those infants who were at a higher stage of permanence with people showed "positive attachment" to their mothers, and those who were at a

higher stage of permanence with objects showed "negative attachment" behavior. Interpretations of these results, however, are open to question. Bell measured attachment behavior according to the infants' responses to their mothers leaving and entering the room, a situation very similar to the successive displacements of people in the person permanence task. This may account for the almost perfect correspondence between positive attachment and high person permanence. In addition, Bell sometimes used the examiner and sometimes the mother in the person permanence task, depending upon the infant's responsiveness. It is not clear what effect this might have had on the results. What is most relevant to the current study is the fact that she found clear differences in infants' levels of mental representation for different objects, animate and inanimate. This difference had been noted in other studies but never had been looked at systematically.

Paradise and Curcio (1974) are the only others who have used both people and inanimate objects to assess stages of mental representation. Their interest was specifically in the cognitive and affective determinants of the fear of stranges in 9-10 month-old infants. They hypothesized that fearful infants would have more advanced permanence scores and would be more "moody" in new situations than nonfearful infants. The results directly concerning their hypotheses are also difficult to interpret as the "fear situation" was similar to

the person permanence task. It was clear, however, that infants differed in level of permanence depending upon whether people or inanimate objects were used, and that most infants (23 out of 30) were more advanced with people.

Lester et al. (1974) attempted to find cognitive mechanisms underlying the onset of separation anxiety in infants, suggesting that a certain level of cognitive structure was necessary in order for infants to be fearful of separation from their parents. He found that infants who were above Stage III on the Escalona Corman Scale with inanimate objects showed more separation protest than older infants or infants of the same age who were below Stage III. Again, the measure of separation protest is confounding since it is so similar to the object permanence task.

Using the Uzgiris-Hunt Scale, Scarr and Salapatek (1970) looked for a threshold on the object permanence scale that could differentiate infants who showed stranger anxiety from those who did not. In this study, no significant differences in level of object permanence were found between infants with and without stranger anxiety. Similarly, Brossard (1974) attempted to find a cognitive threshold for stranger anxiety by using people instead of inanimate objects on the permanence scale (Décarie's). Again, no significant results were obtained.

Hypotheses

The major interest of this study is in the way in which the infant comes to understand the world. The framework is Piagetian, and can be summarized at this point by the following quote:

> Knowledge of reality . . . is neither solely within the subject nor solely within an independent object, but is constructed by the subject according to both the subject's underlying structure and to the properties of the object. (Piaget, 1970)

Piaget has offered a precise and measurable way of conceptualizing the structural process of differentiation of self from non-self in infancy, and psychoanalytic theory has suggested that there are cogent properties of external objects and of internal states that effect this process. It is the intent of this research to study the effects of infants' need states and the effects of objects varying in need-gratifying properties on the infants' levels of mental representation of or degree of differentiation from those objects.

The hypotheses are as follows:

1. There will be differences in the levels of object permanence achieved as a result of infants' different need states.

2. There will be differences in the levels of object permanence achieved as a result of the use of objects differing in need-gratifying properties.

3. There will be differences in the levels of object permanence achieved as a result of infants' different stages of cognitive organization.

4. There will be interactions among the above variables such that patterns characteristic of need states, responses to external objects, and/or cognitive stages will be apparent.

II.

METHOD

Subjects

The sample consisted of 24 white infants, 11 females and 13 males, from middle to upper class, intact families. Infants ranged in age from 31 to 37 weeks. The mean age was 34.04 weeks. All were in good health and had had normal births. In all cases, mothers were the primary caretakers. Thirteen of the infants had been breast-fed at some time. All had been exclusively bottle-fed for at least one week and had been drinking from the bottle for at least three weeks prior to the testing session.

Names of infants were obtained from birth announcements in back issues of local newspapers in Westchester, New York and Fairfield, Connecticut counties. All infants were in Stage III, IV, or V of the sensorimotor period. The methods used for enlisting subjects and for determining stage are described below in the Procedures section.

Measures

Scale

The Object Permanence Scale of the Escalona-Corman Albert Einstein Scales of Sensori-Motor Development was used. The scale is based directly on Piaget's descriptions of infant behaviors in relation to absent objects and "covers the range from Stage III (when an object hidden beneath a cover is not searched for and seems 'lost' to the child) to Stage VI (when the child having observed a complex series of displacements beneath various covers is able to infer where the object is to be found by means of an internalized 'mental representation' of the previously perceived object)" (Corman & Escalona, 1969, pp. 351-352). The scale consists of 18 steps, infants' responses to which unequivocally define the stage in which they function. The scale was extended so that objects in addition to small, interesting toys could be used. The first 10 steps of the scale refer to Stages III, IV, and V. Presentation of these steps evokes 15 possible infant behaviors characteristic of substages in the progression of cognitive organization from the first substage of Stage III to the last substage of Stage V. For purposes of analysis, scores from 1-15 were assigned to the infant behaviors. A copy of the original scale and of the Extension can be found in Appendices A and B. As

can be seen, scores 1-4 correspond to responses characteristic of Stage III, scores 5-9 correspond to Stage IV behaviors, and scores 10-15 to behaviors characteristic of Stage V.

Objects

The following objects were used in tests of object permanence: (1) Neutral object. This object was one of a group of small, interesting toys, unfamiliar to the infant and brought by the experimenter. The group consisted of a necklace made of bright, orange plastic beads; a clear plastic rabbit about two inches tall; a small, red, rubber ball; and a bright green metal car, about two inches long. Whichever toy was chosen by the infant when he or she was presented the group was used throughout testing as the neutral object. The term neutral refers to the fact that these toys, unlike the other objects used, were assumed to have no drive-gratifying properties nor prior histories with the infants. (2) Favorite object. Mothers were asked to provide the object the infants seemed most attached to or most often used for comfort. If mothers could not think of such an object, they were asked whether there was a particular object or toy the infant slept with or cuddled when tired or upset. If the mother identified such an object, it was used in testing and designated the "transitional object" (Winnicott, 1953). If such an object was not

identified, the mother was asked to provide a favorite toy or doll. If neither a transitional object nor a favorite toy could be identified, the infant's pacifier or teether was used. Thus, there were three possible categories of favorite object--a transitional object, a favorite toy, or a teether or pacifier. (3) Bottle. The infant's bottle filled with milk or juice was used. (4) Stranger. Since the infants were not familiar with the experimenter, she served as the stranger in all cases. (5) Mother. Each infant's mother was used as one of the test objects.

Screens used to cover the inanimate objects were brightly colored, soft washcloths, about 12"x12", different sized boxes, and plain cardboard as described in the Escalona-Corman Object Permanence Scale Manual. Screens for hiding the people were brightly colored bath size towels about 2-1/2'x4' which were hung from curtain rods. For the invisible displacement steps in Stage VI, the towels were used in conjunction with large pieces of furniture or closet and room doors in a procedure similar to that described by Bell (1970) and Paradise and Curcio (1974).

Infants were tested twice with each object, once during a state of hunger, and once during an alert, sated state.

States

Hungry and alert states were determined by both mothers' reports and infants' behaviors. Prior to the test sessions, mothers were asked to report the infants' feeding and sleeping patterns and to describe the infants' behaviors when beginning to become hungry, when very hungry, and when most alert and attentive to external stimuli. Test schedules were arranged on the basis of these reports, so that each session included a period of hunger and a period of alertness. The time of day each session took place varied based on infants' different feeding and sleeping patterns. In all cases, the hungry period was about one half-hour before the baby's usual feeding time, and in all cases but one, the alert period was after the meal and, if it was necessary, a brief period of quiet play. Mothers' reports and babies' behaviors during the testing sessions were used to verify the babies' states.

Interview

At some time during the testing session, mothers were asked questions about their baby's development, and their questions about the experiment were answered. Questions concerning demographic data, amount of time various people spent with the infant, and the

infant's responses to strangers were asked. A copy of the outline used in the interview is presented in Appendix C.

Procedure

Pretesting

Letters explaining the general purpose of the research and the amount of time needed with mother and infant were sent to mothers who listed the birth of their infants in local, suburban newspapers. A copy of the letter is shown in Appendix D. The letters were sent in groups of 5-8 to mothers whose babies would be about seven months old at the estimated time of testing. About one week after the letters were mailed, the experimenter called each mother and asked if she would like to talk further about the research and the possibility of participating. Sixty-eight percent of the mothers agreed. Reasons mothers did not want to talk further most often had to do with scheduling problems such as impending vacations, full-time jobs, moving from the area, etc. Babies who were only breast-fed and babies who were ill were not scheduled for appointments. If the mother agreed to talk further, the experimenter explained the research purpose and procedures in more detail. It was explained that the research concerned the ways in which

infants learn about important objects in their environment and how they come to know that these objects exist even when out of view. All mothers who agreed to talk further on the phone also were interested in participating in the study. Information about the infant's birth, and feeding and sleeping patterns was then obtained. A two hour appointment was set up for no more than two weeks after the phone conversation so that the infant's schedule was not likely to change a great deal. It was stressed that the mothers call the experimenter if any changes in the infant's schedule or health occurred. A few appointments had to be readjusted because of such changes.

Letters were sent until at least eight infants in Stages III, IV, and V were tested. Scoring criteria for stages are described below.

Test session

All testing was done in the infants' homes. The experimenter arrived about 45 minutes before the infant's next expected meal. Usually the baby was still napping and about 15 minutes could be spent setting up the test materials, answering any questions the mothers had, gathering further information, and describing the testing procedure to the mother. If the baby was awake and beginning to become hungry, the procedure was briefly explained and the mother was told further explanations would be given while the baby

was being fed. The mother was asked to sit near the infant while testing was done and to comfort her or him if needed. She was also told that at some point she would be the "object" hidden, and she was asked to help hold the apparatus when the experimenter hid. Finally, a tape recorder was set up to record the experimenter's descriptions of the infant's responses.

During testing, the experimenter and infant were seated on the floor. The mother was seated near the infant, available if needed. The infant was given a few minutes to explore and become accustomed to the new objects in the room -- the screens, tape recorder, and the experimenter. Once the infant was comfortable, the experimenter showed him or her the group of neutral toys. The one picked by the infant was then used in testing, following the procedure outlined in the Object Permanence Scale Manual and briefly described in Appendix B. The procedure was begun with Step 1 and each successive step was administered until two consecutive steps were failed twice. At no time did an infant pass a step after having failed a previous one. After two consecutive steps were failed twice, the scale was repeated with each of the other objects. The order was counterbalanced for each subject. With each object after the neutral object, the testing was begun about three steps before the first step failed with the neutral object and was continued again until two consecutive steps

were failed twice. If there was any question about whether a step was passed or failed, that step and the following step were repeated. The general sequence of infant behaviors and the specific responses to test procedures were described aloud by the experimenter as they occurred. Thus, a complete and detailed record of each testing session was obtained on tape and the experimenter was not hampered during testing by having to take notes.

All mothers were very cooperative, friendly, and for the most part, seemed to enjoy the testing sessions. Many were quite knowledgeable about infant development and were interested in the general findings of the research. Infants too seemed to enjoy parts of the testing sessions. Usually, going through the scale with all objects took 30-40 minutes, about ten minutes of which the infants spent playing before becoming reinterested in the tasks. At times, some infants became distressed when an object disappeared from view and had to be comforted before they would again respond to test items.

Scoring

Infants were assigned scores by the experimenter and by an independent rater. In all but a few cases, it was readily apparent to the experimenter whether a step was passed or failed. In those cases where it was not clear at the time of testing, review of the tape

transcript resolved any scoring questions. Transcripts were also read and independently scored by a psychology graduate student familiar with the testing procedures.

For 12 subjects, there were no disparities between the experimenter's and the rater's scoring. For the remaining 12 subjects, there were seven cases in which there was only one disparity, four cases in which there were two disparities, and one subject for which there were three disparities. No scoring difference was ever more than one step apart, and no difference involved an error across a major stage boundary. The rank difference correlation coefficient was .993.

Infant stage was determined by the infant's score on the scale when the neutral object was used in the alert state. This procedure was used since the scale was standardized predominantly with such objects when infants were in an optimal state of attentiveness. It also appears to be consistent with other studies of object permanence. Based on the score, infants were placed in either Stage III, IV, or V. Infants scoring above Stage V or below Stage III were not included in the sample.

III.

RESULTS

An analysis of variance using the scores from 1-15 on the Extension of the Escalona-Corman Object Permanence Scale was done to determine the effects on object permanence scores of hungry and alert states, five different test objects, and three different stages of cognitive organization. In addition, effects of interactions among these variables were examined. Scores from 1-4 correspond to infant responses characteristic of Stage III, scores 5-9 correspond to Stage IV behaviors, and scores 10-15 to behaviors characteristic of Stage V. The analysis of variance summary table is presented in Table 1.

Main Effects

State

Over the whole sample, state had an effect such that infants scored significantly higher on the Object Permanence Scale when they were in an alert state than when they were in a state of hunger, $F(1,21) = 8.296$, $p < .01$. As illustrated in Figure 1, this difference tends to be fairly constant ($\overline{X} = .85$) across the various objects.

Table 1

Analysis of Variance

Source	SS	df	MS	F
State	41.667	1	41.667	8.296**
Object	276.058	4	69.015	11.881***
Stage	1116.858	2	558.429	41.429***
State x Object	6.542	4	1.635	.620 n.s.
State x Stage	12.658	2	6.329	1.260 n.s.
Object x Stage	332.016	8	41.502	7.145***
State x Object x Stage	23.133	8	2.892	1.096 n.s.

**p .01

***p .001

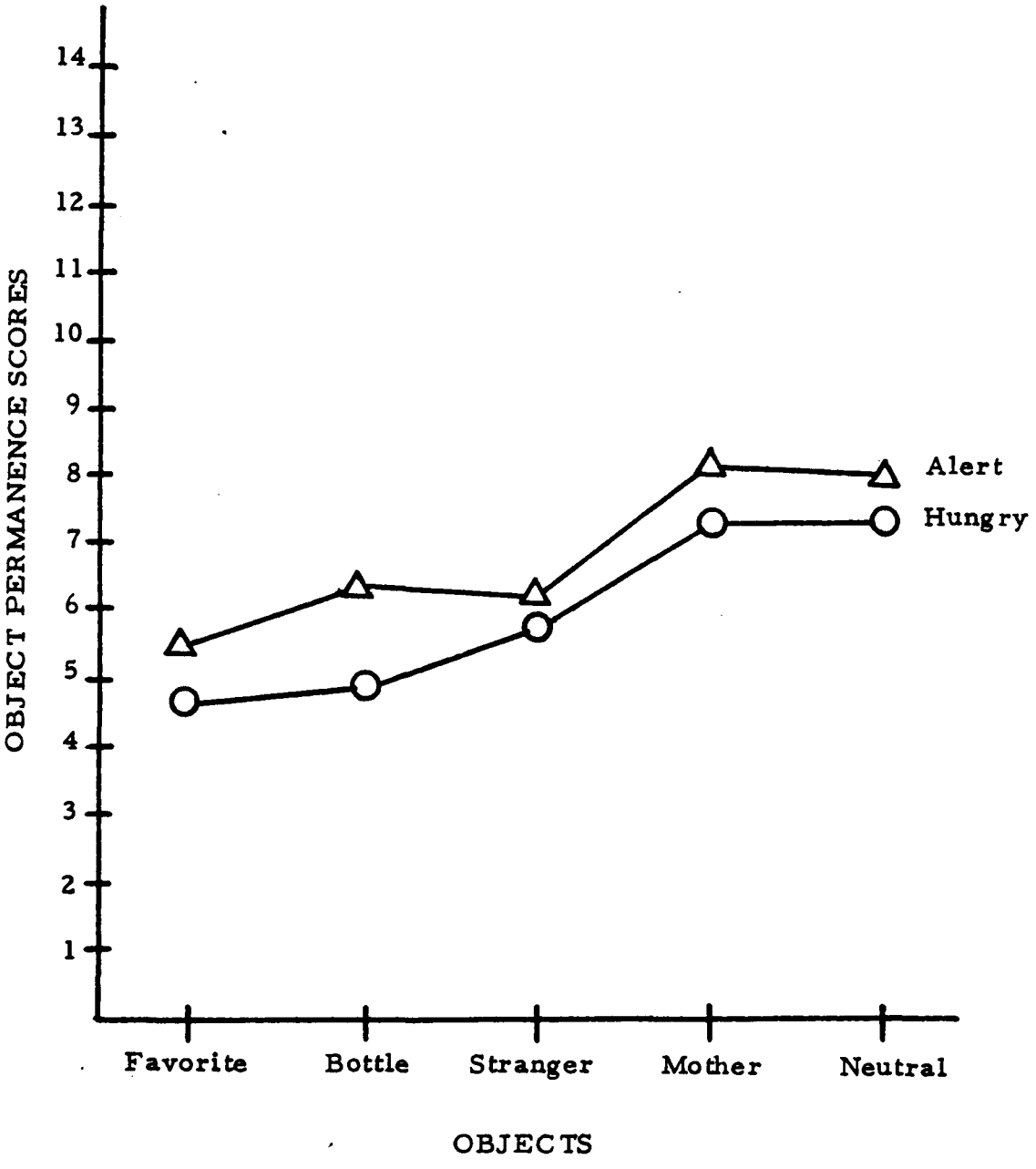


Figure 1. Mean scores in hungry and alert states. (n = 24)

Table 2 shows the mean scores for each object in the hungry and alert states and Table 3 shows the mean scores for each stage during the two states. It can be seen that infants of all stages score higher when alert than when hungry no matter what test object is used.

Objects

Because the difference between infants' scores when hungry and alert was fairly constant across objects and stages, it was decided to merge the hungry and alert data for each subject on each object for all further analyses. As Table 1 shows, the object variable had a significant effect, $F(4,84) = 11.881$, $p < .001$. Over the whole sample, infants scored differently on the Object Permanence Scale when different test objects were used. They scored from highest to lowest with the different objects as follows: mother, neutral, stranger, bottle, and favorite. Means and standard deviations for each object, and t-values for differences between objects are presented in Table 4. Pair-wise T-tests show significant differences between mother and all other objects, between neutral and bottle, and between neutral and favorite. No other significant differences between objects over the whole sample were found. Figure 2 illustrates the different object permanence scores resulting from the use of different test objects.

Table 2

Infants' Mean Scores with Different Objects while in Different States

(n = 24)

		Test Object				
		Neutral	Favorite	Bottle	Stranger	Mother
State	Hungry	7.208	4.750	4.958	5.958	7.208
	Alert	8.042	5.458	6.208	6.250	8.292

Table 3

Stages III, IV, and V Infants' Mean Scores while in Different States

(n = 24)

		Stage		
		III	IV	V
State	Hungry	3.475	6.425	8.150
	Alert	3.750	7.250	9.550

Table 4

Mean Scores and Standard Deviations for Objects & t-Values for Differences between Objects (n = 24)

	M	SD	Favorite t p	Bottle t p	Stranger t p	Mother t p	Neutral t p
Favorite	5.104	2.000	-	-	-	-	-
Bottle	5.583	2.466	-1.51 n.s.	-	-	-	-
Stranger	6.104	2.746	-2.02 n.s.	-0.96 n.s.	-	-	-
Mother	7.750	3.514	-4.88***	-4.36***	-2.39*	-	-
Neutral	7.625	4.276	3.81***	3.17**	1.81 n.s.	-0.18 n.s.	-

*p .05

**p .01

***p .001

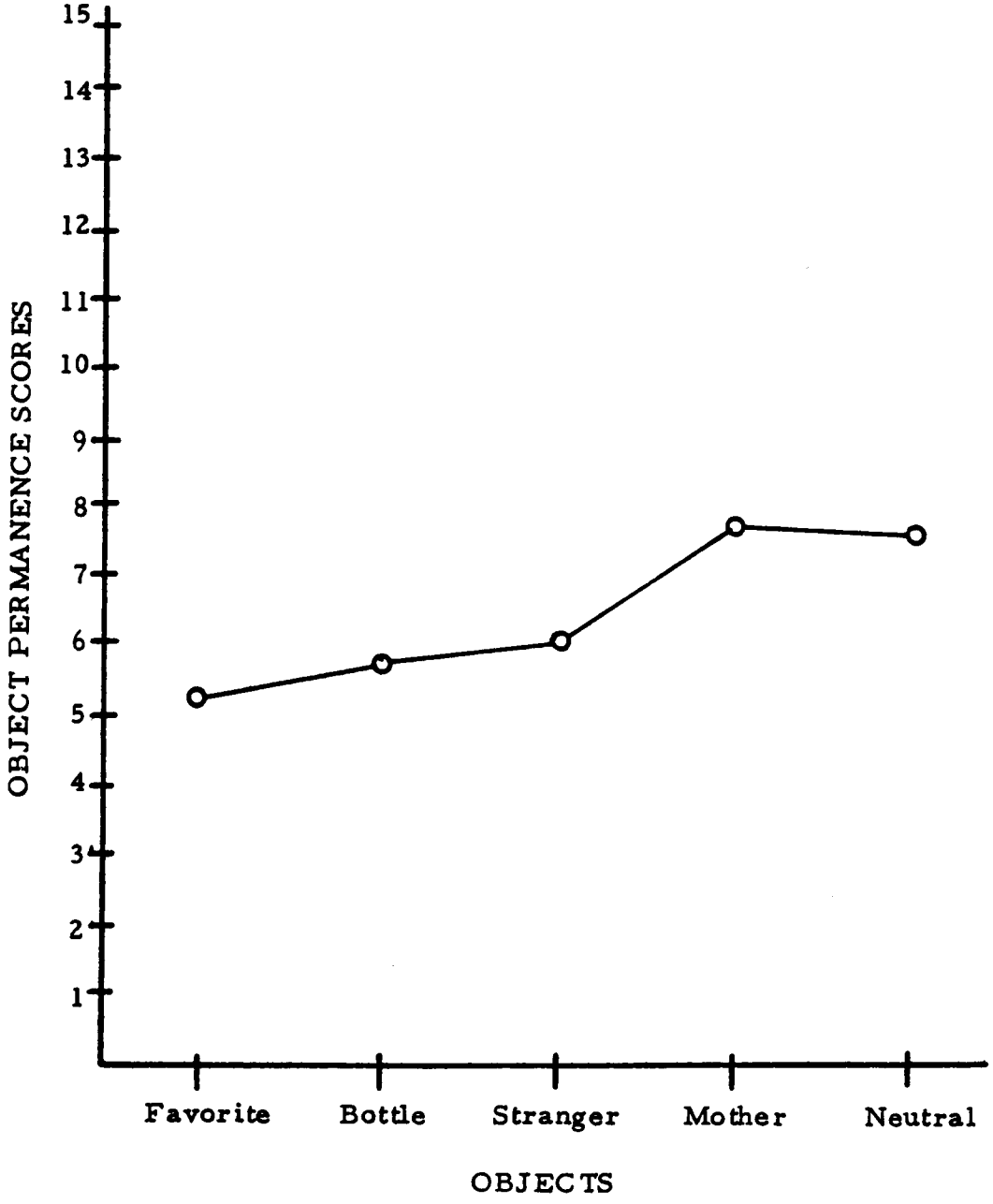


Figure 2. Mean scores for different objects. (Hungry and alert data are merged; n = 24)

Stage

As can be seen in Table 1, stage had a significant effect, $F(2,21) = 41.429$, $p < .001$. Infants score differently on the object permanence scale across different objects in accordance with their stage of cognitive organization. Figure 3 illustrates these differences. Table 5 presents the means and standard deviations for each stage with each object, and the t-values for differences between the stages with each object. It should be noted that Stage III and IV infants and Stage III and V infants score significantly different from each other with all objects, whereas Stage IV and V infants score significantly different from each other only with the neutral object.

Interaction Effects

State X object and state X stage

No interactions were found between state and object nor between state and stage. The effect of state was similar regardless of the object used or the stage of cognitive development.

Object X stage

As Table 1 shows, a significant interaction effect was found between object and stage, $F(8,84) = 7.145$, $p < .001$. The same objects

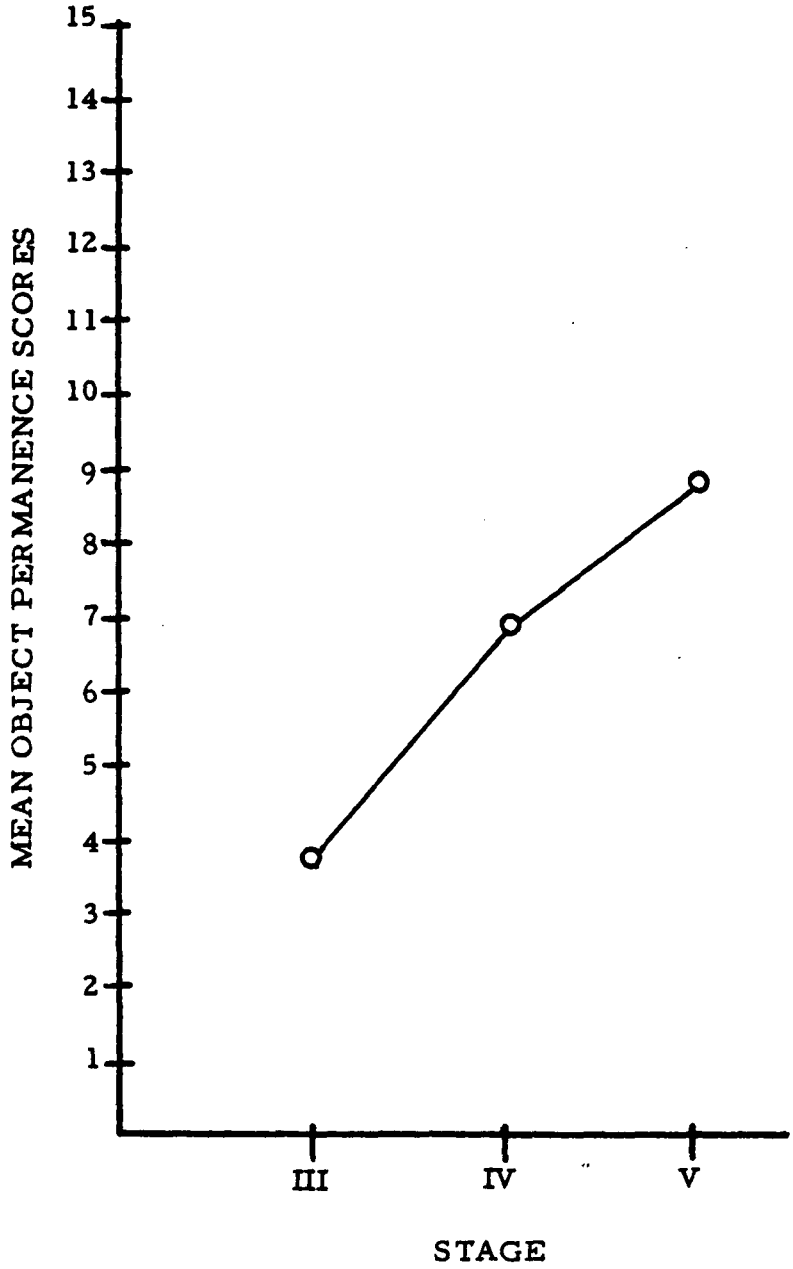


Figure 3. Mean Scores for Different Stages. (n = 24)

Table 5

Means and Standard Deviations for Groups & t-Values for Differences Between Groups on Each Test Object

Test Object	Stages III and IV $\bar{X}$	SD	t	Test Object	Stages III and V $\bar{X}$	SD	t	Test Object	Stages IV and V $\bar{X}$	SD	t
Neutral				Neutral				Neutral			
III	3.562	.563	-6.45***	III	3.562	.563	-11.82***	IV	6.312	1.067	-7.77***
IV	6.312	1.067		V	13.000	2.188		V	13.000		
Favorite				Favorite				Favorite			
III	3.375	.991	-2.84*	III	3.375	.991	-4.58***	IV	5.187	1.510	-1.86
IV	5.187	1.510		V	6.750	1.832		V	6.750		
Bottle				Bottle				Bottle			
III	3.250	.759	-3.19*	III	3.250	.756	-5.95***	IV	6.125	2.431	-1.17
IV	6.125	2.431		V	7.375	1.808		V	7.375		
Stranger				Stranger				Stranger			
III	3.812	.998	-3.48**	III	3.812	.998	-3.24**	IV	7.437	2.770	.28
IV	7.437	2.770		V	7.062	2.652		V	7.062		
Mother				Mother				Mother			
III	4.063	1.266	-3.88**	III	4.063	1.266	-7.76***	IV	9.125	3.462	-.68
IV	9.125	3.462		V	10.062	1.782		V	10.062		

*p .05 **p .01 ***p .001

had significantly different effects depending on the infant's stage of cognitive organization. In looking at the groups separately, it can be seen that Stage III infants did not contribute to different scores among objects because in pair-wise T-tests, none of the scores for objects were significantly different from each other. As can be seen in Table 5, Stage III infants' mean object permanence scores range from 3.250 with the bottle to only 4.063 with the mother, and this difference is not statistically significant. In Stage IV and V babies, however, there is a hierarchy among scores with the five objects in which there are several significant differences. Stage IV babies score from lowest to highest as follows: favorite, bottle, neutral, stranger, mother, where mother is significantly higher than neutral, bottle, and favorite; and stranger is significantly higher than favorite. With Stage V babies, the pattern changes. They score from lowest to highest as follows: favorite, stranger, bottle, mother, neutral where the score with the neutral object is significantly higher than scores with all other objects, and the score with the mother is significantly higher than scores with the bottle, stranger, and favorite objects. These different configurations for each of the stages are illustrated in Figure 4. Means and standard deviations for each object within each stage appear in Table 5, and t-values for differences between objects are presented in Table 6.

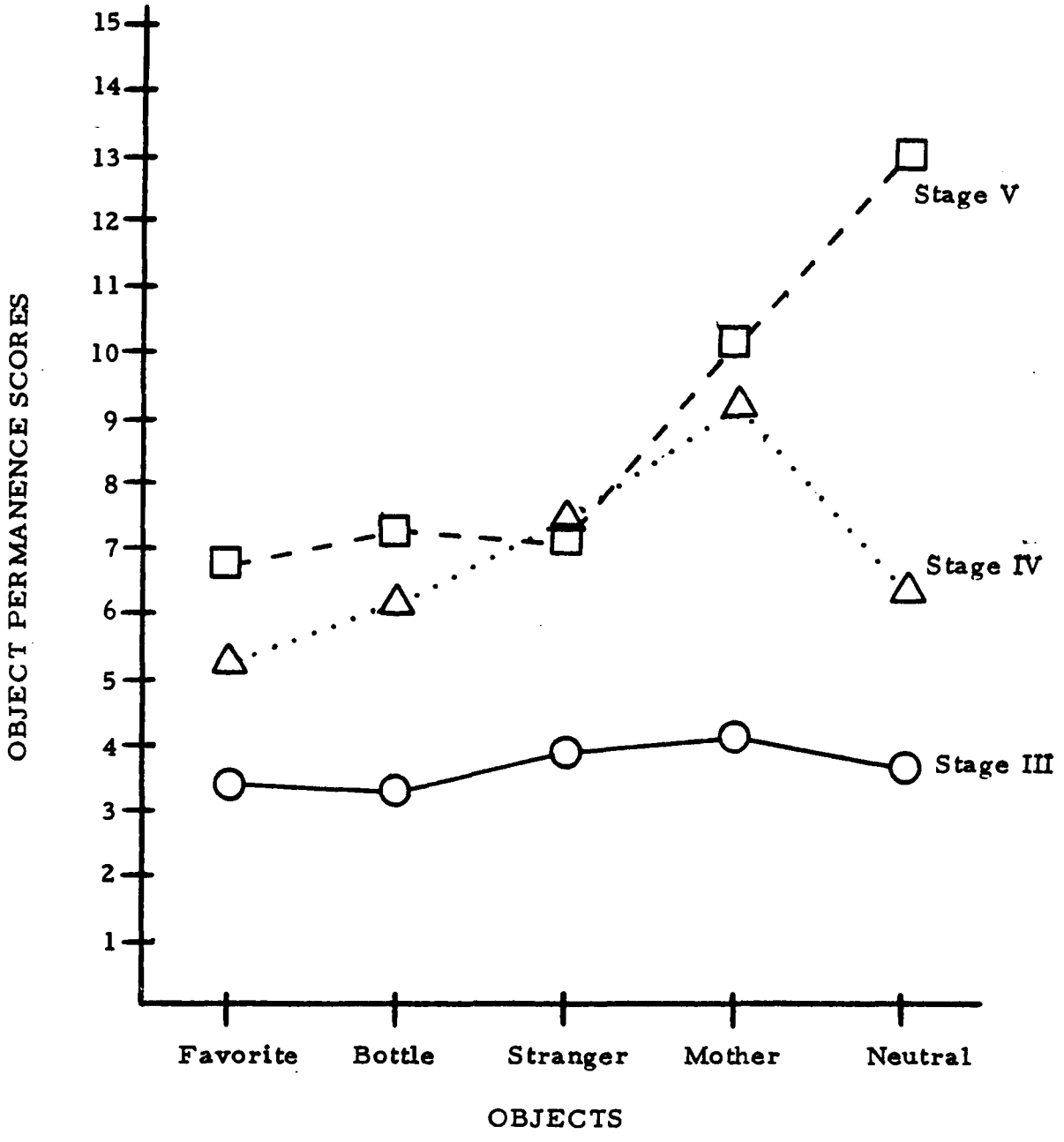


Figure 4. Mean scores for different objects in different cognitive stages.

Table 6

t-Values for Differences
Between Objects in Different Stages

		Favorite	Bottle	Stranger	Mother
Stage III	Favorite	-	-	-	-
	Bottle	.80	-	-	-
	Stranger	-1.18	-1.47	-	-
	Mother	-1.17	-1.55	- .52	-
	Neutral	.75	1.93	- .68	-1.13
Stage IV	Favorite	-	-	-	-
	Bottle	-1.52	-	-	-
	Stranger	-2.66*	-1.06	-	-
	Mother	-3.39*	-2.89*	-1.03	-
	Neutral	1.78	.23	-1.20	-2.46*
Stage V	Favorite	-	-	-	-
	Bottle	- .89	-	-	-
	Stranger	- .28	.31	-	-
	Mother	-5.62***	-3.26*	-2.76*	-
	Neutral	6.97***	6.93***	4.59**	2.79*

*p .05

**p .01

***p .001

Additional Findings

Demographic data, information about infants' feeding and sleeping schedules, and mother's accounts of infants' responses to people and toys were obtained in interviews as previously described. These and the test data were intercorrelated using Pearson Correlations. Items of particular interest were analyzed further.

Age. Subjects ranged in age from 31 to 37 weeks. The mean age was 34.04 weeks. Infants in Stage III were from age 31-36, and Stage IV and V infants were from 32-37 weeks old. No significant correlations were found between age and stage or any other variables.

Sex. The sample consisted of 13 males and 11 females. Five males and three females were in Stage III, three males and five females were in Stage IV, and five males and three females were in Stage V. No significant correlations were found between sex and any other variables.

Breast feeding. Thirteen of the 24 infants had been breast fed at some time. Breast feeding did not correlate significantly with infants' performance on the object permanence task with the bottle, the mother, or any other object.

Significant others known. Infants were very familiar with from two to six adults and from zero to four children. No significant corre-

lations were found between the number of people an infant knew and any other variable.

Mother as only caretaker. Sixteen of the 24 infants were taken care of almost exclusively by their mothers. These mothers did not work outside the home. The remaining eight mothers either had part-time jobs or had full-time help in caring for the infants. In the Stage III group, all but one of the eight mothers (87.5%) were the only caretakers. Five of the eight (62.5%) Stage IV infants had mothers who were the only caretakers. Four of the eight (50%) Stage V babies had mothers who were the only caretakers. Infants whose mothers were the only caretaker scored significantly lower on the object permanence task when the neutral object and the bottle were used (Neutral: $r = -.3906$, $p < .05$; Bottle: $r = -.3435$, $p < .05$).

Transitional objects. Using the criteria described previously, it was determined that ten infants had a transitional object. Six infants did not have a transitional object but had a toy that was clearly favored. Five infants had teethers or pacifiers which were used in testing, and in three cases, it was not clear whether an object was a favorite toy or a transitional object. Seven of the ten infants who had transitional objects scored lowest with this object on the object permanence scale. Six of the seven infants who did not have a transitional object but who had a favorite toy, never scored lowest with this toy on the object

permanence scale. A Fisher's Exact Test show these differences to be significant at the .05 level. No significant correlations were found between the transitional object item and any other variable.

Stranger anxiety. According to mothers' accounts, six infants had never exhibited anxiety in relation to strangers; ten infants currently showed mild anxiety reactions to strangers; seven currently showed strong anxiety reactions; and one infant no longer exhibited anxiety reactions to strangers but had in the past. Using the Mann Whitney U Test, it was found that those infants who never experienced stranger anxiety scored significantly higher on the object permanence scale with the stranger than infants who currently experienced anxiety in relation to strangers ($p < .05$). Further analysis revealed that the one infant in the Stage V group who never experienced stranger anxiety was the only one of eight infants in the group to have scored higher with the stranger than with any of the other objects. All other infants in that group scored lowest or next lowest with the stranger. Similarly, of the two infants in the Stage IV group who never experienced stranger anxiety, one scored highest and the other scored next highest with the stranger. Though not included in the statistical analysis, the same trend can be seen in the Stage III group. In this stage, two of the three infants who never experienced stranger anxiety scored highest with the stranger.

IV.

DISCUSSION

State

Infants were tested while they were hungry and again while they were sated and alert in order to study the effect of need states on mental representations of absent objects. Hypotheses about these effects were based on the notion in psychoanalytic theory that differentiation of self and object representations proceeds in infancy through repeated experiences of need, need frustration, and need gratification (Rapaport, 1958). It was thought there would be significant differences not only between the scores infants obtained on the object permanence scale when hungry and when alert, but also that there would be differences based on that effect in interaction with objects varying in hunger-gratifying properties, and in interaction with the infants' different levels of cognitive organization. Further, it was not clear in which direction state effects could be expected.

The finding that the hunger state had an overall disruptive effect on infants' performance and that there were no interactions does not support the psychoanalytic views on which the above hypotheses were

based. Wolff (1960) questions whether "specific need states and their affective accompaniments lead to the discovery of reality conditions which would otherwise be found only much later . . . " (p. 176). He further questions whether states of inner tension might lead to the development or crystallization of adaptive mechanisms of delay. In accordance with this, it might have been expected that infants would have performed better on the object permanence task when hungry than when alert. This was the case in only 18 of the 120 possible times in which it could have occurred, and in half of those cases the infants' scores when hungry were only one step higher than their scores when alert. The results clearly indicate that at least the immediate effect of hunger states on established mental representations of objects in the infants tested is almost always disruptive.

The long-range effects of need states might be different. The results do not contradict the view that stabilization and further development of mental representations occurs through the cumulative effects of need, need frustration, need gratification cycles.

Psychoanalytic theory might also predict that need states would differentially effect mental representations of different objects. Pine (1974) writes:

> We would expect differences in the infant's capacity to evoke the image of an absent physical object . . . if the child is in a state of high arousal, tension,

> longing, or craving. For the high drive state which by definition, is part and parcel of the attachment to the libidinal object is likely to make for conditions of the representation of the object (or of loss or destruction of that representation, or of the inability to make use of it) that are very different from those holding for the relatively minimally and transiently cathected physical objects. (p. 308)

Thus it was expected that infants' representations of and performances with the objects having hunger-gratifying properties would be different in the two states and that they would be different from infants' representations of and performances with non-gratifying objects. This also was not found to be the case. The need state affected infants' performances with all objects in essentially the same ways regardless of the different objects' need gratifying properties. It should be noted that object permanence scores during the hungry state are not so low so as to suggest loss or destruction of the object representations. Rather the scores seem more consistent with a notion of regression of functioning during states of need or tension.

The hypothesis that there would be an interaction between the effect of state and the infants' different stages of cognitive organization was also not confirmed. It was expected that state might have less of an effect on Stage V infants' performances than on Stage III or Stage IV. This hypothesis was based on the psychoanalytic view that as mental representations of need gratifying objects become more stable,

infants gain greater degrees of autonomy from the demands of need (McDevitt, 1975). Thus an increasing tolerance of tension states was expected. Although this was not found, it is possible that infants tested were not yet at advanced enough stages of cognitive organization for a decrease in the disruptive effect of need states to be seen. It is also possible that mental representations of objects in fact do develop further during need states but are not yet available to the infant. That is, it may be that structuralization occurs during states of need or tension but that the newly acquired functions are not used until optimal states are experienced.

In sum, the results show that infants' overall performance on the object permanence task is lower when the infants are in a state of hunger than when they are alert. The findings are most consistent with the view that need states cause momentary disruptions in infants' representations of absent objects and temporarily impair infants' functioning. This finding refers only to the effect of state on established representations and does not indicate what the effect may be on the further development and stabilization of representations. Finally, it should be noted that it cannot be assumed effects of hunger are the same as the effects of other need states. Results might be

different if fatigue, need for comfort, or another need state rather than hunger had been used.

Stage and Object Interaction: Characteristics of Stages

Infants in Stage IV and Stage V, and not in Stage III attained significantly different object permanence scores when different objects were used. In addition, the particular patterns of scores formed by these differences varied from stage to stage. It is suggested that these patterns can be viewed as characteristic of the stages and can be understood in terms of a correspondence between infants' cognitive organization and affective development, resulting in stage-specific patterns of mental representations of external objects.

Stage III

Most characteristic of Stage III infants is their homogeneity of response to different objects. They score similarly on the object permanence scale no matter which object is used. The scores reflect the infants' inability to maintain mental representations of objects in their absence, and this is the case no matter what the infants' interest in or desire for an object. Piaget (1952) describes behavior patterns

of this stage as having a "deep unity." All objects are approached in the same way, with the aim of using them as aliments for the newly developed secondary schemas. The infants' focus of interest is on his or her action on objects and on reproducing the external events those actions provoke. Everything becomes an object to be shaken, rubbed, chewed, etc. whether it is the mother or an interesting, new toy.

Spitz (1950) similarly characterizes the object at this stage. Its significance lies in its "capacity to fulfill the exact requisites of a given need-configuration" (p. 141). Thus, although there are certainly different needs and interests associated with different objects, their properties nevertheless are assimilated by the infant in the same way. Mahler, Pine, and Bergman's (1975) descriptions of the peak of the symbiotic phase and the beginnings of differentiation seem to correspond to the cognitive organization of Stage III. Mahler postulates a shift in cathexis from internally directed to "outward direction attention cathexis," the infant's interest thereby moving beyond only his or her actions. Mahler would add that the beginnings of the infant's differentiation of self from other takes place in the context of the symbiotic unit. It is "safe anchorage within the symbiotic orbit" that promotes the infant's interest in things that are external to her or him.

The following descriptions of infants' responses on the object permanence scale clearly illustrate the salient characteristics of Stage III:

Baby 17. The beads (neutral object) are placed in front of the baby on the floor. As he reaches for them, they are covered with a cloth. His gaze is intently on the beads and then on the cloth covering the beads. He grasps the cloth and pulls it off, watching the cloth in his hand. He does not see the beads. He is given the beads to hold and the cloth is taken from him. He shakes the beads, pulls them with his other hand, drops them, picks them up, and shakes them again. The beads are then placed in front of him again and covered as he reaches for them. He shakes his head, looks at the cloth, and then looks around the room.

The baby's pacifier is placed in front of him. When it is covered as he reaches for it, he watches the cloth and grasps it when it is laid over the pacifier. When his hand touches the cloth, he shifts his gaze from the cloth to his hand and watches both as he pulls the cloth off the pacifier. He then shakes the cloth. A few seconds later, he notices the pacifier, picks it up and shakes it.

Baby 21. The mother kneels in front of the baby and calls to her. As the baby reaches for her, a towel is dropped between them blocking the baby's view of the mother. The baby looks at the towel, looks down

at the floor, grasps the towel and rubs her face with it. She then looks around the room, pulls the towel, and looks surprised to see her mother.

Results of this study support Piaget's view that in Stage III objects are of interest insofar as they can be used as aliments for the secondary schemas. This is not to say that a necklace or a pacifier is as significant to the infant as is the mother, but that the infant understands and organizes the representation of the necklace in the same way as representations of the mother. Piaget (1952) writes in reference to the mental representations characteristic of this stage:

> [When the object is removed from view] . . . there ensues a vacuum which the child immediately tries to fill and he does so by utilizing the movements which have just been performed. When these movements lead to a result which resembles the earlier spectacle, there is certainly recognition, but recognition does not presuppose the existence of representation. Recognition simply requires that the new result embrace entirely the structure of the assimilatory schema outlined at the beginning of circular reaction. (p. 183)

Stage IV

Stage IV infants in this study scored significantly higher on the object permanence scale when the mother was used than when other objects were used. The object infants scored next highest with was the stranger. It appears that the distinction in infants' responses to

and in mental representations of people and inanimate objects is the feature most characteristic of Stage IV.

According to Piaget, in Stage IV the secondary schemas are intercoordinated. This enables infants to understand objects in relationship to each other. When two secondary schemas are coordinated, they bear upon two or more objects at the same time. The objects are distinguished from one another while still subsumed under a single schema, and as such they must be put in relation to each other. In terms of the present study, in order for an infant to find an object hidden by a screen, the infant must think of the object in relation to the screen and not only in relation to the act of grasping. In addition, the schema of grasping must become dissociated from the objects grasped. That is, grasping the screen must become distinct from grasping the object. Thus the schemas become detached from their contents and are applied to a growing number of objects which are in turn put in relation to each other. Intercoordination of the secondary schemas directs the infants' focus and interest to objects themselves. The infant's intent is to understand external objects and in order to do so, the infant attempts to make each object enter his or her schemas "in order to see in which respects they suit it" (Piaget, 1952, p. 259).

From the cognitive point of view it is possible to understand in what way people, particularly the mother, come to be of primary interest and most highly differentiated from the infant at this stage. Piaget asserts that when an infant tries to assimilate an object, one of two results can occur. The object either fits the schema tried out and the child is satisfied, or the object resists and thus poses unexpected properties. The infant then behaves as in Stage III and tries to rediscover and repeat the actions with the object that led to the interesting result. People undoubtedly resist infants' assimilatory attempts more than do inanimate objects. They too can be poked, grasped, pulled, etc., but unlike inanimate objects, they respond differently at different times. It is likely then, that as people pose resistance, they become further differentiated from infants' actions, and as they are further explored, they become still more interesting.

Mahler, Pine, and Bergman (1975) also note a period in which there is an increase in exploration of the mother. It occurs at the end of the differentiation subphase of separation-individuation. They write:

> The baby begins comparative scanning . . . He becomes interested in "mother" and seems to compare her with "other," the unfamiliar and the familiar, feature by feature. He starts to discriminate between mother and he or she or <u>it</u> that looks, feels, moves differently from, or similarly to, mother. (p. 56)

Examples of characteristic Stage IV behaviors during the object permanence tasks follow:

Baby 8. The baby's teething ring is placed in front of her. She looks at the teething ring. A cardboard screen is placed in front of it blocking the baby's view of the ring. The baby grasps the cardboard keeping her gaze on the place in which she saw the ring. She drops the cardboard at her side without looking at it, picks up the teething ring, and sucks it. A cloth is placed in front of the baby and the teething ring is taken from her. She watches the ring as it is slowly hidden under the cloth. When it is no longer in view, she looks at the experimenter's hands, then at her mother, then at the experimenter's hands, then crawls to her mother.

Baby 5. The baby's mother kneels in front of the baby. A towel is dropped between them, hiding the mother from the baby's view. The baby looks at the towel, then laughs, then pulls the towel, looks at his mother and laughs. The mother steps behind the towel hanging from the rod. The baby watches her and when she is no longer in view, he laughs. He then quickly crawls to the towel and pulls it, and is delighted to find his mother. With two screens up, the mother hides behind the second. The baby looks from the first to the second and makes a screaming, laughing sound, then looks at the experimenter and then back to the second screen. He crawls to it, finds his mother and

laughs.

In Stage IV the mother is clearly the primary object of the infant's interest. This appears to be the case both in light of the unusual features she presents to the infant's assimilatory schemas as well as in light of the affectional needs she gratifies. The "checking back" pattern described by Mahler aptly characterizes this stage and depicts the correspondence between stage-specific affective and cognitive development. The checking back behavior pattern consists in the infant's continual looking to the place where the mother was last seen while the infant explores other objects and places. In terms of the mental representation of the mother, it has not yet become distinct from the perception of her presence in a particular place, although there is prevision, that is, the internalized expectation that she will be in that place. In terms of affective development, the mother is the primary object. It is her image that the infant seeks when she or he "checks back" from explorations of new situations.

Stage V

Most characteristic of Stage V infants in this study were their significantly higher scores on the object permanence scale when the neutral object was used. There was little advance over Stage IV in

the development of representations of other objects, including the mother.

Piaget (1952) describes Stage V as the stage in which elaboration of the object occurs. Schemas are developed towards the aim of searching for novelty both in objects and in actions. The tertiary circular reaction is the behavior pattern characterizing this stage. It consists of the infant's modifications of an effect obtained fortuitously in order that the nature of the various different effects can be studied. Piaget states:

> In effect, for the first time, the child truly adapts himself to unfamiliar situations, not only by utilizing the schemata acquired earlier but also by seeking and finding new means. . . . He tries, through a sort of experimentation, to find out in which respect the object or event is new. (1952, pp. 265-266)

Mahler, Pine, and Bergman (1975) describe the early practicing period as being characterized by a shift in interest from the mother to inanimate objects. They write, "The central feature of this subphase as we see it [is] the elated investment in the exercise of the autonomous functions, especially motility, to the exclusion of apparent interest in the mother at times" (p. 69).

The pattern of scores obtained by Stage V infants in this study can be understood in terms of the correspondence between cognitive developments resulting in interest in novelty, and affective develop-

ments resulting in decreased interest in the mother. The neutral object and stranger are the only two novel objects used in this study and it is likely that scores with the stranger were lowered by the infants' anxiety responses to strangers. The single infant in Stage V who had never experienced stranger anxiety scored highest on the object permanence scale when the stranger was used and next highest when the neutral object was used.

The following are examples illustrating Stage V behaviors:

Baby 10. With two cloths in front of the baby, his bottle is hidden under the second. He watches the bottle and when it is out of view he makes a crying sound, then grasps the cloth, pulls it off, picks up the bottle and drinks from it. A third cloth is placed in front of him. The bottle is taken from him and hidden under the third cloth. He watches it and when it is out of view, he again makes a crying sound and then quickly turns and crawls away. He picks up the boxes used in Step 2 lying in another part of the room and looks in them.

Baby 15. After successfully performing the three parts in Step 10, the necklace is placed in a small box and hidden under a cloth. The baby watches the necklace go into the box and then the box as it is emptied under the cloth. When the box is brought from under the cloth, she grasps it, looks inside, shakes it, and then crawls away

to explore another object she sees on the floor.

Thus in Stage V, there appears to be a primacy of inanimate, novel objects over the mother and other familiar objects. Further, the data suggest the infants' representation of mother does not advance and may in fact regress. This would be in keeping with Mahler's observation of a decrease in interest in the mother during the early practicing phase. Piaget describes the progress in cognitive organization in Stage V as resulting in the infant's discovery that he or she can no longer make things enter known schemas. In Piaget's terms, "The universe becomes stocked with centers of forces" and the infant responds with increasing "attitudes of expectation, surprise and almost of anxiety and great astonishment" as progressive spontaneity is conceded to external objects (1952, p. 277). It is possible that the infant at this stage cannot sustain long a Stage V view of the mother as an independent force not subject to the infant's wish for her appearance at the place she was last seen, and therefore returns to an earlier understanding of her while progressing in development in relation to inanimate objects.

Continuity of Stages

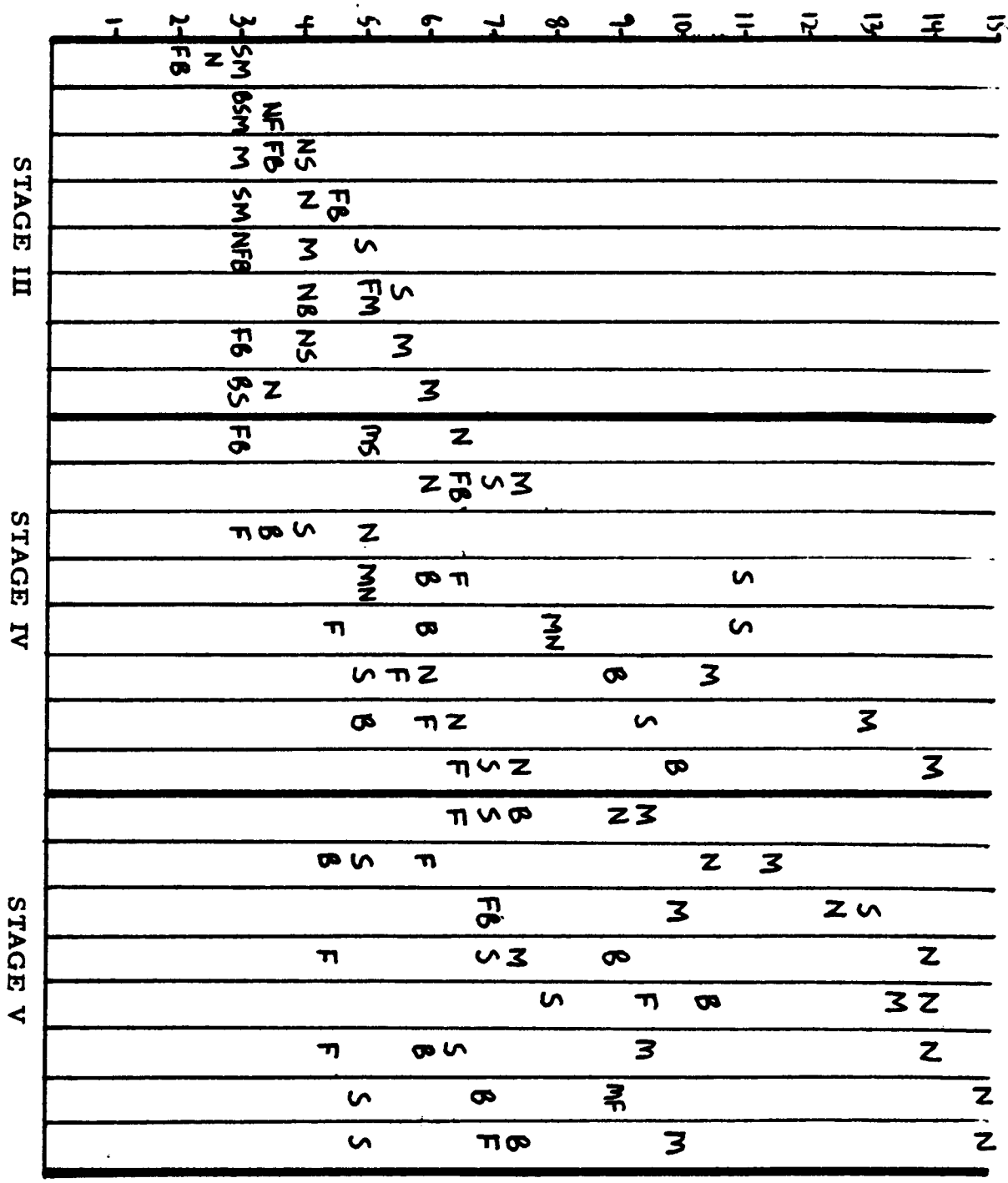
In sum, results of this study suggest that there is an interaction between infants' cognitive organization and affective development which results in characteristic stage-specific patterns of mental representa-

tions of objects. In Stage III there is little differentiation among external objects. From the viewpoint of cognitive development, it appears as if interest in objects is focused on the ways in which they can be assimilated to newly developed secondary schemas. All objects are understood in the same way, through their properties of "shakability," "graspability," "suckability," etc. Insofar as the mother is not differentiated from the infant nor from other objects, she too is viewed as having "graspable," "suckable," and "shakable" parts. Insofar as she and other people pose resistance to the infants' assimilatory attempts, they become differentiated from inanimate objects. The coordination of secondary schemas in Stage IV enables the infant to put things in relation to each other. The infants' cognitive understanding of external objects no longer is homogeneous. Objects are more or less interesting because of the specific properties they present to the particular cognitive organization of that stage. The mother is primary in Stage IV both because of her need gratifying properties and because she offers the most interesting aliment to Stage IV cognitive structures. It appears that once infant's cognitive capacity develops beyond the belief that objects can be made to reappear at the last place they were found, the mother, understood in this way, becomes a potential object of anxiety. The infant's interest turns from her to inanimate objects and the infant's representation of

the mother during Stage V remains essentially the same as earlier. She is understood as an object that exists where she was last found. It is likely that new objects become of primary interest in Stage V because they are well suited to schemas directed toward experimentation and manipulation, and also because their disappearance from the place in which they were last found does not evoke as much distress as does the mother's disappearance. Thus in Stage V, the infant can retain a Stage IV view of the mother as existing when and where the infant wishes her, while the infant advances cognitively through exploration of new objects. The infant, in addition, can maintain a view of other objects that is at still another level of cognitive organization. For example, the transitional object can be understood as an object simply at the disposal of the infant's action upon it. The stranger, who might evoke anxiety, can also be rendered as an object of the infant's action and is thereby stripped of attributes and forces independent of the infant.

The results of this study further suggest a continuity of infant development in the passage from stage to stage within which the patterns of object representations characteristic of each stage can vary according to particular differences among infants and objects. Figure 5 presents the scores with each of the objects for each of the infants in the present study. These have been arranged on the basis

OBJECT PERMANENCE SCORES



N = neutral
F = favorite
B = bottle
S = stranger
M = mother

Figure 5. Object permanence scores illustrating continuity of stages.

of considerations discussed above. Overall patterns characteristic of the three stages, the continuity in passage from stage to stage, and individual variations within those patterns can be seen.

A Re-examination of Bell's 1970 Study

Bell's study was the first to compare infants' object permanence scores when people and inanimate objects were used. Her results and interpretations of results have been extensively cited in the object permanence literature. It therefore is important to discuss her work in relation to the present study.

Bell's study was based on the assumption that in normal development, permanence of the representation of the mother precedes permanence of inanimate object representations. In addition, the quality of attachment to the mother was thought to influence which category of objects was primary. She tested 33 infants at 8-1/2 and 11 months using a scale similar to the Escalona-Corman Scale. The inanimate test object was a small toy of supposed interest to the baby which was changed if the baby lost interest. The person used during testing was most often the mother, though if the baby seemed more responsive to the experimenter, she was used instead. Attachment was measured by the Strange Situation Procedure (Ainsworth & Bell,

1970) which consists of eight episodes of mother and/or stranger leaving and entering the room in which the baby remains. Those babies who predominantly showed higher object permanence scores when the person was used were designated "Positive Decalage." Babies showing higher scores when the object was used were termed "Negative Decalage." Babies who approached or sought proximity to the mother when reuinited with her in the Strange Situation were said to have a positive attachment. Those babies who showed relatively little proximity seeking were said to have negative attachments.

Bell found that at 8-1/2 months, Positive Decalage babies averaged permanence scores with the person between the last substage of Stage V and the first substage of Stage VI. Scores with the object averaged at the beginning of Stage V. Infants in the Negative Decalage group had person permanence scores averaging at Stage IV and object permanence scores averaging between the beginning and end of Stage V. At 11 months, all scores were within Stage VI. Bell found in addition, that the babies with positive decalage tended to be the same babies who showed positive attachment behavior, and that the babies in the negative decalage group tended to show negative attachment behavior. She interpreted these results to signify that a positive relationship between mother and infant, indicated by positive attachment behavior, leads to more advanced cognitive development in

object permanence with people and with inanimate objects.

It is interesting to note that Bell's results can be interpreted quite differently in light of the present study. The group of babies she classified as Negative Decalage showed much the same patterns as those infants in this study classified as Stage V. They attained higher scores with inanimate objects than with people; their scores with the new, interesting object tended to be within Stage V and their scores with the mother within Stage IV. In addition, in that they do not actively seek proximity to the mother in the Strange Situation, their behavior appears characteristic of the beginning of the practicing phase (Mahler, Pine, & Bergman, 1975). Babies in Bell's study who were classified as Positive Decalage have scores with people that are in Stage VI. There is no corresponding group in the present study, but it can be hypothesized that the pattern characteristic of Stage VI babies is one in which representations of the mother again become primary over inanimate objects. Thus, it is not necessary to hypothesize poor interrelationships between mothers and infants when infants display more interest in inanimate objects than in people. Rather, it seems this can be understood as behavior characteristic of a normal phase occurring in the infants' development of understanding and relating to external objects. Categorizing infants according to age seems to confound the issue of stage-specific behaviors and

mental representations of people and inanimate objects. It appears primacy of the mother as a cognitive object can only reasonably be discussed in the context of cognitive stages.

Discussion of Additional Findings

Mother as only caretaker. Infants whose mothers were the only caretakers scored lower on the object permanence task than infants who had more than one caretaker. It is difficult to say to what this might be due. It may be that infants' varied experiences with different people fosters cognitive development of differentiations among external objects. This is a variable that might be further investigated.

Transitional objects. Seven of the ten infants who had transitional objects scored lowest with this object than with any of the others. This suggests the representations of the transitional object are less differentiated from self-representations than are representations of other objects. This finding is consistent with Winnicott's (1953) description of the transitional object as one which remains a "not me" possession experienced as intermediate between self and non-self.

Stranger anxiety. Results of mother's reports about infants' anxiety responses to strangers are consistent with Mahler, Pine, and Bergman's (1975) observations that there are large individual differences

and variations in timing and quality of what has been termed stranger anxiety. Also, the lack of correlation with stage, suggests stranger anxiety is not a predominately cognitively determined stage-specific phenomenon. Paradise and Curcio (1974) and Lester et al. (1974) found similar results. This, too, might be an area for further research.

BIBLIOGRAPHY

Ainsworth, M. D., & Bell, S. M. Attachment, exploration, and seperation illustrated by the behavior of one-year-olds in a strange situation. Child Development, 1970, 41, 49-67.

Bell, S. M. The development of the concept of object as related to infant-mother attachment. Child Development, 1970, 41, 291-311.

Brossard, M. The infant's conception of object permanence and his reactions to strangers. In G. Décarie (Ed.), The infant's reaction to strangers. New York: International Universities Press, 1974.

Burgner, M., & Edgcumbe, R. Some problems in the conceptualization of early object relationships. Part II: The concept of object constancy. Psychoanalytic Study of the Child, 1972, 27, 315-333.

Casati, I., & Lezine, I. Les étapes de l'intelligence sensori-motorice de l'enfant de la haissance à deux ans. Paris: Centre de Psychologie Appliquee, 1968. (Kopp, C. B., Sigman, M., & Parmalee, A. H. Longitudinal study of sensorimotor development. Developmental Psychology, 1974, 10 [5], 685-695.)

Corman, H., & Escalona, S. Stages of sensori-motor development: A replication study. Merrill-Palmer Quarterly of Behavior and Development, 1969, 15, 351-361.

Décarie, G. Intelligence and affectivity in early childhood: An experimental study of Jean Piaget's object concept and object relations. New York: International Universities Press, 1965.

Escalona, S. Emotional development in the first year of life. In I. M. J. E. Senn (Ed.), Transactions of the sixth conference on problems of infancy and childhood. New York: Josiah Macy Jr. Foundation, 1953.

Escalona, S., Corman, H., Galenson, E., Schecter, D., Schecter, E., Golden, M., Levi, A., & Barax, E. Albert Einstein scales of sensori-motor development. Unpublished, Department of Psychiatry, Albert Einstein School of Medicine, 1967.

Evans, W., & Gratch, G. The stage IV error in Piaget's theory of object concept development: Difficulties in object conceptualization or spatial localization? Child Development, 1972, 43, 682-688.

Flavell, J. H. The developmental psychology of Jean Piaget. Princeton, N. J.: Van Nostrand, 1963.

Fraiberg, S. Libidinal object constancy and mental representation. Psychoanalytic Study of the Child, 1969, 24, 9-47.

Freud, A. The psychoanalytic study of infantile feeding disturbances. Psychoanalytic Study of the Child, 1946, 2, 119-132.

Freud, A. The mutual influences in the development of ego and id. Psychoanalytic Study of the Child, 1952, 7, 42-50.

Freud, A. Psychoanalysis and education. Psychoanalytic Study of the Child, 1954, 9, 9-15.

Freud, A. Discussion of Dr. John Bowlby's paper. Psychoanalytic Study of the Child, 1960, 15, 53-62.

Furth, H. G. Piaget and knowledge. Englewood Cliffs, N. J.: Prentice-Hall, 1969.

Golden, M., & Birns, B. Social class and cognitive development in infancy. Merrill-Palmer Quarterly of Behavior and Development, 1968, 14, 139-149.

Golden, M., & Birns, B. Social class, intelligence, and cognitive style in infancy. Child Development, 1971, 42, 2114-2116.

Gratch, G. Recent studies based on Piaget's view of object concept development. In L. B. Cohen & P. Salapatek (Eds.), Infant perception (Vol. 2). New York: Academic Press, 1975.

Gratch, G., & Landers, W. F. Stage IV of Piaget's theory of infants' object concepts: A longitudinal study. Child Development, 1971, 42, 359-372.

Hartmann, H. The mutual influences in the development of ego and id. Psychoanalytic Study of the Child, 1952, 7, 9-30.

Hartmann, H. Contribution to the metapsychology of schizophrenia. In Essays on Ego Psychology. New York: International Universities Press, 1964. (Originally published, 1953.)

Hartmann, H., Kris, E., & Loewenstein, R. Comments on the formation of psychic structure. Psychoanalytic Study of the Child, 1946, 2, 11-38.

Hoffer, W. Psychoanalysis: Practical and research aspects. Baltimore: Williams & Wilkins, 1955.

Hunt, J. McV., Paraskevopoulos, J., Schickendanz, D., & Uzgiris, I. Variations in mean ages of achieving object permanence under diverse conditions of rearing. In B. Z. Friedlander, G. Sterritt, G. E. Kirk (Eds.), The exceptional infant (Vol. 3). New York: Bruner/Mazel, 1975.

Inhelder, B. Some aspects of Piaget's genetic approach to cognition. Monographs of the Society for Research in Child Development, 1962, 27, 19-34.

Kaplan, L. J. Object constancy in light of Piaget's vertical decalage. Bulletin of the Menninger Clinic, 1972, 36(3), 322-334.

Kopp, C., Sigman, M., & Parmelee, A. Longitudinal study of sensorimotor development. Developmental Psychology, 1974, 10(5), 685-695.

Kramer, J., Kennedy, H., & Cohen, L. Infants' development of object permanence: A refined methodology and new evidence for Piaget's hypothesized ordinality. Child Development, 1975, 46, 149-155.

Kris, E. Some comments and observations on early autoerotic activities. Psychoanalytic Study of the Child, 1951, 6, 95-116.

Landers, W. F. The effect of differential experience on infants' performance in a Piagetian stage IV object-concept task. Developmental Psychology, 1971, 5, 48-54.

LeCompte, G., & Gratch, G. Violation of a rule as a method of diagnosing infants' levels of object concept. Child Development, 1972, 43(2), 385-396.

Lester, B., Kotelchuck, M., Spelke, E., Sellers, M., & Klein, R. Seperation protest in Guatemalan infants: Cross cultural and cognitive findings. Developmental Psychology, 1974, 10(1), 79-85.

Mahler, M. On the significance of the normal separation-individuation phase. In M. Schur (Ed.), Drives, affects, behavior (Vol. 2). New York: International Universities Press, 1965. (Originally published, 1963.)

Mahler, M., Pine, F., & Bergman, A. The psychological birth of the human infant. New York: Basic Books, 1975.

McDevitt, J. B. Seperation-individuation and object constancy. Journal of the American Psychoanalytic Association, 1975, 23(4), 713-742.

Miller, D., Cohen, L., & Hill, K. A methodological investigation of Piaget's theory of object concept development in the sensory-motor period. Journal of Experimental Child Psychology, 1970, 9, 59-85.

Panel Discussion. International Journal of Psychoanalysis, 1968, 49(283), 506-512.

Paradise, E., & Curcio, F. Relationship of cognitive and affective behaviors to fear of strangers in male infants. Developmental Psychology, 1974, 10(4), 476-483.

Paraskevopolous, J., & Hunt, J. McV. Object construction and imitation under differing conditions of rearing. Journal of Genetic Psychology, 1971, 119(2), 301-321.

Piaget, J. The origins of intelligence in children. New York: W. W. Norton, 1952.

Piaget, J. The construction of reality in the child. New York: Basic Books, 1954.

Piaget, J. Genetic epistemology. New York: Columbia University Press, 1970.

Pine, F. Libidinal object constancy: A theoretical note. In L. Goldberger & V. H. Rosen (Eds.), Psychoanalysis and contemporary science (Vol. 3). New York: International Universities Press, 1974.

Rapaport, D. The theory of ego autonomy. In M. Gill (Ed.), The collected papers of David Rapaport. New York: Basic Books, 1967. (Originally published, 1958.)

Scarr, S., & Salapatek, P. Patterns of fear development during infancy. Merill-Palmer Quarterly, 1970, 16, 53-90.

Spitz, R. Psychiatric therapy in infancy. American Journal of Orthopsychiatry, 1950, 20, 1-6.

Spitz, R. The first year of life. New York: International Universities Press, 1965.

Spitz, R. Metapsychology and direct infant observation. In R. M. Loewenstein, L. M. Newman, M. Schur, & A. J. Solnit (Eds.), Psychoanalysis — a general psychology. New York: International Universities Press, 1966.

Uzgiris, I. Patterns of cognitive development in infancy. Merrill-Palmer Quarterly, 1973, 19(3), 181-204.

Uzgiris, I., & Hunt, J. McV. Assessment in infancy: Ordinal scales of psychological development. Chicago: University of Illinois Press, 1975.

Wachs, T., Uzgiris, I., & Hunt, J. McV. Cognitive development in infants of different age levels and from different environmental backgrounds: An exploratory investigation. Merrill-Palmer Quarterly, 1971, 17(4), 283-317.

Winnicott, D. W. Transitional objects and transitional phenomena. The International Journal of Psycho-Analysis, 1953, 34, 89-97.

Wolff, P. H. The developmental psychologies of Jean Piaget and psychoanalysis. New York: International Universities Press, 1960.

Appendix A

ESCALONA-CORMAN OBJECT PERMANENCE SCALE SCORING SHEET

Subject: _____ Age: ____ Sex: ____ Ethnic: _____

Examiner: _____ Observer: _____ Date: _____

Code No.: _____

ITEM	SCORE	N.AD.	M.T.	CONDENSED DESCRIPTION
				STAGE III
(1)	III;1			Removal of obstacle to perception – cloth over S's face
(3)	III;2			Vertical motion of object
(4)	III;3			Horizontal motion of object
(5)	III;4			Interrupted prehension
				STAGE IV
(2)	IV;1			Obstacles to perception – pillow, cloth in front of E, removed or surmounted by S.
(6)	IV;2			Vertical Screen – pillow, cloth, hand in front of object, removed or surmounted by S.

Code No.: _____

ITEM	SCORE	N. AD.	M.T.	CONDENSED DESCRIPTION
				Visible Displacements (Object hidden under one pad, in one hand or box)
(7)	IV;3			S finds object directly twice Object hidden under pad _____ in box _____ in hand _____ Vehicle used: hand _____ box _____
				Complex Visible Displacements (After object found twice at location A, object hidden at B.)
(8)	IV;4			S searches only at A. Object hidden under pad _____ in hand _____ Vehicle used: hand _____ box _____
(8)	IV;5			S first searches at A, then B. Object hidden under pad _____ in hand _____ Vehicle used: hand _____ box _____
				STAGE V
(8)	V;1			S searches directly at B. Object hidden under pad _____ in hand _____ Vehicle used: hand _____ box _____

Code No.: _____

ITEM	SCORE	N.AD.	M.T.	CONDENSED DESCRIPTION
				(Three Pads)
				(After object found twice under pad A, once under B, object hidden under pad C.)
(9)	V;2			S first searches under A and/or B, then C. Vehicle used: hand _____ box _____
(9)	V;3			S searches directly under C. Vehicle used: hand _____ box _____
(9)	V;4			Object randomly hidden under one of three pads. S searches directly under correct pad. (3 in succession) Vehicle used: hand _____ box _____
				STAGE VI
				Invisible Displacements (Object invisibly left under one pad, or displaced invisbly from one hand to another)
(11)	VI;1			Object transferred from hand to hand _____ Object invisibly left under pad _____ Vehicle used: hand _____ box _____

Code No.: _____

ITEM	SCORE	N.AD.	M.T.	CONDENSED DESCRIPTION
				Complex Invisible Displacements
				(Two Pads)
				(After object found under Pad A twice, object hidden directly under B)
(12)	VI;2			After checking hand or box, S searc searched under A, then B.
				Vehicle used: hand _____ box _____
(12)	VI;3			After checking hand or box, S searched directly under B.
				Vehicle used: hand _____ box _____
				(Three Pads)
				(After object found under Pad A twice, once under B, object hidden directly under C)
(13)	VI;4			After checking hand or box, S searches under A and/or B, then C.
				Vehicle used: hand _____ box _____
(13)	VI;5			S checks hand or box, then searches directly under C.
				Vehicle used: hand _____ box _____

Code No.: _____

ITEM	SCORE	N.AD.	M.T.	CONDENSED DESCRIPTION
				Serial Invisible Displacements* (Two Pads) (Object passed under A and left at B. On second trial object passed under B and left at A. Two trials required for score.)
(14)	VI;6			After checking hand or box, S searches under A, then B. (on second trial first under B then A) Vehicle used: hand _____ box _____
(14)	VI;7			After checking hand or box, S searches directly under B (directly under A). Vehicle used: hand _____ box _____

*In items 14, 15 and 16, Serial Invisible Displacement, the designation of pads as A, B, C, refers only to the first, second and third pads used by the examiner. A need not be established as the position at which the object was last hidden and found, as above.

Code No.: _____

ITEM	SCORE	N.AD.	M.T.	CONDENSED DESCRIPTION
				(Three Pads) (After object found under second pad twice, object passed under A, then B, and left under pad C.)
(15)	VI;8			After first checking hand or box, S searches under A and/or B, then C. Vehicle used: hand _____ box _____
(15)	VI;9			After first checking hand or box, S searches directly under C. Vehicle used: hand _____ box _____
				Object passed under two pads, left under third - both position of pads and sequence in which pads are visited varies from trial to trial.
(16)	VI;10			Regardless of position of pads, sequence visited, S seeks object where hand last emerged. Vehicle used: hand _____ box _____
(18)	VI;11			Sequential displacements - three containers or screens.

Appendix B

EXTENSION OF OBJECT PERMANENCE SCALE

Stage	Step	Procedure/Objects	Procedure/ People	Response	Score
III 1	1	Hold cloth over child's face.	Same.	Removes or alters position to see.	1
IV 1	2	Cover E's face with cloth or hands.	Same.	Removes or alters position to see.	5
III 2	3	Hold ball of wool above eye level and drop.	Person squats quickly.	Eyes move down.	2
III 3	4	Move object on string from front to side quickly.	Person moves from front to side quickly.	Eyes follow.	3
III 4	5	Place object within reach. While child grasps, cover.	Person extends arms and calls to baby. When baby reaches, drop screen between person and baby.	Continues reaching and grasps object or person.	4
IV 2	6	Hide object in hand or box or under screen.	Hold up screen and have person walk behind it slowly.	Finds object or person. Knocks down or pulls screen and obtains object or person.	6

Appendix B, cont'd

Stage	Step	Procedure/Objects	Procedure/ People	Responses	Score
IV 3	7	Slowly hide object in hand or box or under screen.	Hold up screen and have person walk behind it slowly.	Finds object or person.	7
IV 4	8	Place two screens in front of baby. Hide object under first. After found hide under second.	With two screens on rod, person walks behind first. When found, walks behind second.	a. Child searches under first screen only.	8
IV 5				b. Child searches first at A then at B.	9
V 1				c. Child searches directly at B.	10
V 2	9	Place third screen in front of child and hide object under it.	Add third screen to rod and have person walk behind it.	a. Child searches at A or B, then C.	11
V 3				b. Child searches directly at C.	12
V 4	10	Hide object under three screens in order: ACB, BCA, or BAC.	Hide person behind three screens in order: ACB, BCA or BAC.	a. Finds person or object first time only.	13
				b. Finds person or object twice.	14
				c. Finds person or object three times.	15

Appendix C

INTERVIEW DATA

Name: Subject #:

DOB: Date of Testing:

Age in weeks: Time:

Feeding:

history of bottle feeding:

present schedule:

behavior when hungry:

Alert States:

most alert time of day:

present sleep schedule:

People:

people present in home and schedules:

others baby is familiar with:

response to strangers:

response when mother leaves or enters room:

Objects:

transitional object:

favorite toy:

other:

Appendix D

LETTER SENT TO INFANT'S MOTHERS

THE CITY COLLEGE
of
The City University of New York
New York, N. Y. 10031

The Psychological Center
Department of Psychology

(212) 690-6602, 3, 4

Dear

I am a local resident working on my doctoral dissertation in Psychology at The City University of New York. I obtained your name and address from birth announcements in the Daily Item or Greenwich Time and understand that your child is now about eight months old. I am studying normal development during the first year of life and hope that you might be able to help me with my research.

Briefly, I am interested in the ways in which infants begin to know about different objects and people in their environment. The study involves my spending about two hours with you and your baby, playing with various objects. In my experience, it is not stressful for the baby and can be interesting and informative for the mother.

I would appreciate having the opportunity to discuss this research with you further and will call you within the next week. I hope you will be interested in participating. In the meantime, if you have any questions, please feel free to call me at (914) 937-6099.

Sincerely yours,

Sally Moskowitz