Does Conceptual Information Take Precedence Over Perceptual Information Early in Development? Evidence From Perseveration Errors

Anna V. Fisher (fisher49@andrew.cmu.edu)
Department of Psychology, Baker Hall 345-I
5000 Forbes Ave, Pittsburgh, PA 15213 USA

Abstract

Generalization is a fundamental cognitive process; however mechanisms of generalization early in development remain contested. According to one theoretical position, from very early in development conceptual information takes precedence over perceptual information. According to the alternative position, effects of conceptual knowledge have a protracted developmental course. The goal of the present research was to examine directly whether 3- to 5-year-old children privilege conceptual information over perceptual information. Participants were presented with triads of objects in which category membership conflicted with appearance similarity. Half of the children were first asked to sort pictures by category membership and then switch to sorting by similarity; the order of tasks was reversed for the other half of the children. A strong asymmetry in perseveration errors was observed across all three age groups: there was a marked decrease in accuracy when children were asked to switch form sorting by similarity to sorting by category membership, whereas the decrease was less pronounced when children were asked to switch from sorting by category membership to sorting by similarity (particularly for 4- and 5-year-old children who exhibited virtually no decrease in accuracy in the latter condition).

Keywords: Categorization, Cognitive Development; Cognitive Flexibility, Perseveration.

Introduction

Generalization is a fundamental cognitive process because it allows us to acquire new knowledge by extending known to the unknown. Humans exhibit remarkable generalization abilities very early in development. For example, 3- and 4-month-old infants can learn to categorize artificial dot patterns (Bomba & Siqueland, 1983) as well as naturalistic stimuli (Quinn, Eimas, & Rosenkrantz, 1993); by 10 months of age infants are capable of performing simple generalizations about object properties, such as pattern of motion (Rakison, & Poulin-Dubois, 2002; Baldwin, Markman, & Melartin, 1993); and by 24 months of age children readily extend known labels to novel objects (Booth & Waxman, 2002; Jones & Smith, 1998; Smith, Jones, & Landau, 1996). However, mechanisms of generalization early in development remain contested.

There is little disagreement in the literature that perceptual factors influence both early and mature generalization (for review see Murphy, 2002). For instance, French, Mareschal, Mermillod, & Quinn (2004) demonstrated that 3- and 4-month-old infants form a representation of the category "cat" that excludes dogs, and a representation of the category "dog" that includes cats. The basis for this asymmetry was infants' sensitivity to the distribution information of perceptual features (such as leg length, head width, ear separation, etc.) and the fact that feature distribution of the category "cat" is subsumed within the feature distribution of the category "dog". Therefore, the asymmetry was reversed when infants were presented with a set of stimuli in which the inclusion relationship of the feature distributions was reversed (French, et. al., 2004). When children learn their first words, they extend new words to refer to correct objects or overextend new words to refer to items perceptually similar to correct objects (Huttenlocher & Smiley, 1987). Importantly, perceptual similarity effects are also well documented in mature generalization (Malt, 1994; Sloman, 1993; Osherson, Smith, Wilkie, Lopez, & Shafir, 1990; Nosofsky, 1984; Rips, Shoben, & Smith, 1973).

There is also little disagreement that mature generalization is often influenced by conceptual factors, such as knowledge of the taxonomic hierarchies, expertise in a particular domain, or knowledge of an object's function (Heit & Rubinstein, 1994; Proffitt, Coley, & Medin, 2000; Wisniewski, 1995). However, while conceptual effects in mature generalization are well documented, the developmental course of these effects remains unclear. One possibility is that early in development generalization processes are driven primarily by the low-level mechanisms of perception, attention, and memory, with conceptual factors emerging as an important influence on generalization later in development (McClelland, & Rogers, 2003; Rakison, 2003; Sloutsky, & Fisher, 2004; Sloutsky, 2003; Samuelson, & Smith, 2000; Smith, 2000). However, it has been argued that perceptual factors *alone* are insufficient to explain early generalization, and conceptual factors (e.g., knowledge of the ontological status of the object) permeate learning from early infancy (Booth & Waxman, 2002; Gelman, 2003). Furthermore, it has been suggested that when perceptual and conceptual information are in conflict, conceptual information "takes precedence" over perceptual information (Booth & Waxman, 2002; Gelman & Markman, 1986; Gelman, 2003).

The goal of the present research was to address the question whether young children privilege conceptual information over perceptual information using a task traditionally used to examine cognitive flexibility - a Dimension Change Card Sorting (DCCS) task, which is a simplified version of the Wisconsin Card Sort Test (Berg, 1948). In the DCCS task children are presented with a set of cards depicting familiar objects that differ on two dimensions, such as color and shape (e.g., the cards may depict red and blue flowers, and red and blue boats). Children are first asked to sort cards according to one dimension, for example shape (in this case they need to group blue flowers with red flowers, and blue boats with red boats). Upon completing this task, children are asked to sort cards according to a different dimension, for example color (in this case they need to group red boats with red flowers, and blue boats with blue flowers).

Considerable amount of evidence suggests that despite understanding and remembering the instructions, children younger than four years of age often fail to shift attention away from a previously relevant dimension, perseverating in sorting by the original dimension (Zelazo, Frye, & Rapus, 1996; Jacques, Zelazo, Kirkham, & Semcesen, 1999). It is important to note that children are equally likely to perseverate if they start sorting by shape and switch to sorting by color, and if they start sorting by color and switch to sorting by shape.

However, it has been demonstrated that experimentally manipulating saliency of chosen dimensions can dramatically improve children's cognitive flexibility (Fisher, 2008). Dimension saliency may play a crucial role in flexible shifts of attention among object dimensions because salient information has been demonstrated to automatically capture attention in children as well as adults (Koch & Ullman, 1985; Smith, Jones, & Landau, 1996; Treisman & Gelade, 1980; Trick & Enns, 1998; Underwood, Foulsham, van Loon, Humphreys, & Bloyce, 2006). Therefore, shifting attention from a less salient object dimension to a more salient dimension should require less cognitive control (and therefore lead to more successful performance) than shifting attention from a more salient to a less salient dimension (or shifting attention between two equally salient dimensions).

These predictions have received empirical support (Fisher, 2008). Differential saliency of dimensions was achieved by representing the dimension of color by two similar values (e.g., red and pink) and the dimension of shape by dissimilar values (e.g., stars and flowers; see Figure 1). Increasing similarity of values representing the dimension of color was expected to reduce the saliency of this dimension relative to the dimension of shape, which was represented by two dissimilar values. Effectiveness of this manipulation was confirmed in a separate calibration experiment: children were accurate in sorting objects based on either dimension, however they were over 1000 ms faster in sorting pictures by shape than by color. When presented with these stimuli in the DCCS paradigm, 3-year-old children were more successful in switching to sorting by a more salient dimension (i.e., shape) than to sorting by a less salient dimension (i.e., color); in fact, when switching to sorting by the more salient dimension, children's accuracy in the post-switch phase was equivalent to their accuracy in the pre-switch phase. At the same time, children were equally successful in sorting by both shape and color during the pre-switch phase, suggesting that poor post-switch performance when switching to sorting by color cannot be attributed to poor discrimination of the specific values of the color dimension values (i.e., red and pink).

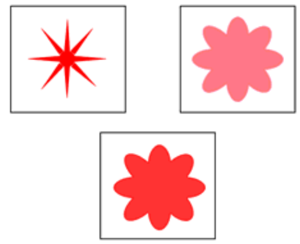


Figure 1: Example of stimuli used in Fisher (2008).

Findings describe above suggest that young children are largely successful in switching to sorting by a more salient dimension and make perseveration errors when switching to sorting but not by a less salient dimension. These findings can be used to directly examine whether conceptual information is more salient that perceptual information early in development: If conceptual information is more salient than perceptual information, then children should be more successful in switching to sorting by conceptual information; however if perceptual information is more salient than conceptual information, an opposite pattern of performance should be observed. To test these possibilities, in the present research participants were presented with triads of pictures in which conceptual information (i.e., category membership) was in conflict with perceptual information (appearance similarity).

Method

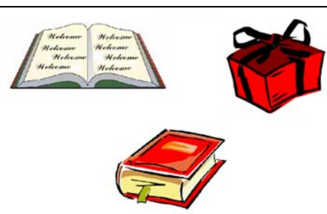
Participants

Participants were 49 3-year-old children (M = 3.51 years of age, SD = .25 years; 27 females and 22 males), 39 4-year-old children (M = 4.40 years of age, SD = .27 years; 24 females and 15 males), and 28 5-year-old children (M = 5.26 years of age, SD = .30 years; 9 females and 19 males). All participants were recruited from child care centers in the Pittsburgh area.

Materials

Materials consisted of eight experimental triads in which a target object (e.g., an open umbrella) shared category membership with one test item (e.g., a folded umbrella) but looked similar to the other test item (e.g., a mushroom). The location of the category matches and appearance matches (i.e., to the left or to the right of the target) was counterbalanced across the eight triads. All triads used in this research are presented in Table 1. In addition to the experimental triads, there was an instruction triad depicting a lemon (target), a lemon slice (category match) and a tennis ball (appearance match). This triad was used to explain the task to participants and responses on this triad were excluded from all analyses reported below.

Table 1: The list of experimental triads.

Target: Umbrella Appearance match: Umbrella Category Match: Mushroom	
Target: Light bulb Appearance Match: Pear Category Match: Christmas lights	
Target: Chocolate Cake Appearance Match: Hat Category Match: Birthday Cake	
Target: Red Flower Appearance Match: Star Category Match: White Flower	
Target: Oak Tree Appearance Match: Broccoli Category Match: Christmas Tree	
Target: Red Balloon Appearance Match: Lollipop Category Match: Group of 3 Balloons	
Target: Closed Book Appearance Match: Present Box Category Match: Open book	
Target: Round Clock Appearance Match: Plate Category Match: Grandfather Clock	

Design and Procedure

There were two between-subject conditions: a Perceptual-to-Conceptual Switch condition and a Conceptual-to-Perceptual Switch condition. In the Perceptual-to-Conceptual Switch condition children were first asked to group together objects that "look similar" and then switch to grouping together objects that are "the same kind of thing". The order of tasks was reversed in the Conceptual-to-Perceptual Switch condition.

The experiment was administered on a laptop computer using SuperLab Pro software, and the order of trials was randomized for each participant. Participants were randomly assigned to the Conceptual-to-Perceptual and Perceptual-to-Conceptual Switch conditions, and interviewed individually by hypothesis-blind experimenters. After completing the task, all children were presented with a familiarity check: they were shown all pictures used in the experiment proper, one by one, and asked to identify the depicted objects. The goal of the familiarity check was to ensure that all of the objects used in this study were familiar to children.

Results

Familiarity Check

In addition to the labels provided in Table 1, the following types of responses were scored as correct: (1) semantically similar labels (e.g., "pie" instead of "cake, "bowl" instead of "plate", "watch" instead of "clock); (2) super-ordinate labels substituted for basic-level labels (e.g., "fruit" instead of "pear", "candy" instead of "lollipop"); and (3) substitutions from the same basic-level category (e.g., "apple" instead of "pear", "celery" or "cauliflower" instead of "broccoli", "popsicle" instead of "lollipop"). Substitutions from the basic-level category comprised less than 5% of responses and were scored as correct *only* if the child correctly identified the other two pictures in the corresponding triad: this was done because confusing "broccoli" for "celery", given that the child knows that the other objects in the triad are trees, should lead to the same pattern of sorting (both by appearance and category membership) as correct identification of the object as "broccoli". Additionally, over 80% of children in all age groups identified the "star" as "sun"; because these children clearly exhibited knowledge that this object belonged to a different category than the other two objects in the triad (i.e., a white flower and a red flower), these responses were scored as correct.

Children in all age groups exhibited near-ceiling accuracy during familiarity check, averaging 91%, 93%, and 96% of correct responses in the 3-, 4-, and 5-year-old group respectively. Therefore, any observed differences in sorting accuracy can not stem from children being unfamiliar with the objects used in this research.

Sorting accuracy

Proportions of correct responses by age group and condition are presented in Table 2. To analyze sorting accuracy proportion of correct responses in the post-switch phase was subtracted from the proportion of correct responses in the pre-switch phase for each participant. Analyses reported below were based on these difference scores averaged across participants (Figure 2).

Three-year-old Children The majority of three-year-old children exhibited poor pre-switch accuracy in both experimental conditions. Overall, 15 out of 23 participants in the Conceptual-to-Perceptual Switch condition, and 17 out of 26 participants in the Perceptual-to-Conceptual Switch condition failed to provide at least 6 out of 8 (or 75%) correct responses during the pre-switch phase.

As shown in Figure 2, three-year-old children who passed the pre-switch phase (providing at least 75% of correct responses) exhibited a somewhat larger decrease in accuracy in the Perceptual-to-Conceptual condition than in the Conceptual-to-Perceptual condition (averaging a 42% and a 23% decrease in accuracy respectively, independent-samples t (15) = 1.5, one-tailed p = .08; this difference reached only marginal significance likely due to very small number of children who passed the pre-switch phase).

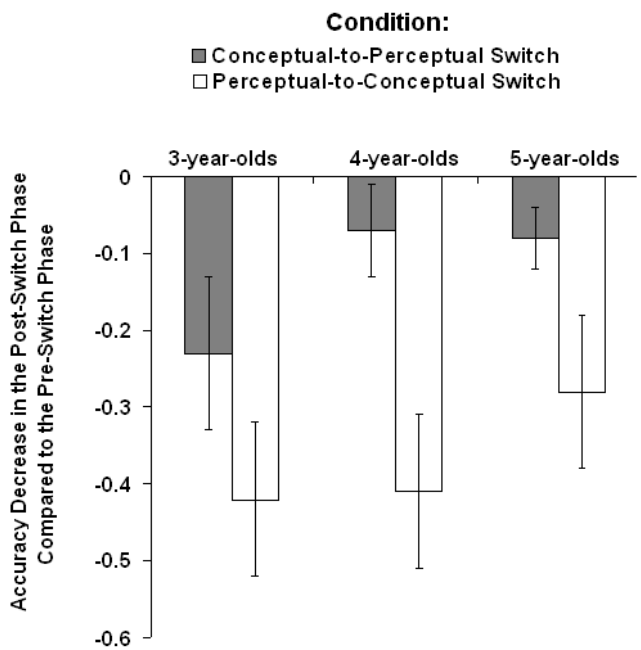
Four-year-old Children The majority of four-year-old children passed the pre-switch phase in both experimental conditions. Overall, 8 out of 18 participants in the Conceptual-to-Perceptual Switch condition, and 8 out of 21 participants in the Perceptual-to-Conceptual Switch condition failed to provide at lest 75% (or 6 out of 8) of correct responses during the pre-switch phase.

Table 2: Proportions of correct responses by age group and condition.

	Perceptual-to-Conceptual condition		Conceptual-to-Perceptual condition	
Participants who did not pass the pre-switch phase				
	Pre-switch phase	Post-switch phase	Pre-switch phase	Post-switch phase
3-year-olds	.41	.55	.35*	.60
4-year-olds	.48	.53	.38	.42
5-year-olds	.54	.60*	.42	.58
Participants who passed the pre-switch phase				
3-year-olds	.88*	.39	.80*	.56
4-year-olds	.85*	.41	.82*	.75*
5-year-olds	.91*	.63*	.93*	.85*

* Means that are different from chance (chance = 50%; $p < .05$) are marked with an asterisk (*).

Figure 2: Decrease in accuracy in the post-switch phase compared to the pre-switch phase.



Four-year-old children who passed the pre-switch phase (providing at least 75% of correct responses) exhibited a pronounced decrease in accuracy in the post-switch phase compared to the pre-switch phase in the Perceptual-to-Conceptual condition (41%, below zero, one-sample t (12) = 3.48, p < .005). At the same time, the decrease in accuracy in the post-switch phase compared to the pre-switch phase in the Conceptual-to-Perceptual condition was not significant (7%, not different from zero, one-sample t (9) < 1.3, p > .26). Furthermore, the decrease in accuracy in the Perceptual-to-Conceptual condition was greater than decrease in accuracy in the Conceptual-to-Perceptual condition (independent-samples t (21) = 2.29, p < .05; see Figure 2).

Five-year-old Children The majority of five-year-old children passed the pre-switch phase in both experimental conditions. Overall, only 3 out of 12 participants in the Conceptual-to-Perceptual Switch condition and 6 out of 16 participants in the Perceptual-to-Conceptual Switch condition failed to provide at lest 75% (or 6 out of 8) of correct responses during the pre-switch phase.

Five-year-old children who passed the pre-switch phase (providing at least 75% of correct responses) exhibited a pronounced decrease in accuracy in the post-switch phase compared to the pre-switch phase in the Perceptual-to-Conceptual condition (28%, below zero, one-sample t (9) = 2.7, p < .05). At the same time, the decrease in accuracy in the post-switch phase compared to the pre-switch phase in the Conceptual-to-Perceptual condition was not significant (8%, not different from zero, one-sample t (8) < 1.3, p > .12; see Figure 2).

Difference scores were submitted to a two-way ANOVA with Age (3-, 4-, and 5-year-old children) and Condition (Conceptual-to-Perceptual Switch and Perceptual-to-Conceptual Switch) as between-subject factors. This analysis revealed a main effect of condition (F (1, 53) = 9.51, $p < .05$), with the effect of age and age-by-condition interaction being not significant (both Fs < 1.5, ps > .24).

Findings presented above suggest that across all three age groups many children found it challenging to sort pictures by a single dimension when there was a strong conflict between the dimensions. Specifically, 65% of 3-year-olds, 41% of 4-year-olds, and 32% of 5-year-olds did not pass the pre-switch phase of the task (the proportion of 3-year-old children failing the pre-switch phase was different from the proportion of 4- and 5-year-old children failing the pre-switch phase, both χ^2s > 5.16, ps < .01). As is shown in Table 2, with few exceptions these children performed at chance level during both phases of the task.

However, those children who successfully resolved conflict between conceptual and perceptual information and passed the pre-switch phase, exhibited an asymmetric pattern of perseveration during the post-switch phase. In particular, when children switched from sorting by category membership to sorting by appearance similarity, across all age groups perseveration was lower (in the case of 4- and 5-year-old children the decrease in accuracy in the post-switch was not different form zero) than when children switched from sorting by appearance similarity to sorting by category membership (in the case of 3- and 4-year-old children the decrease in accuracy in the post-switch phase was greater than 40%).

Discussion

Results presented above point to two important findings. First, when presented with triads of familiar objects in which there was a strong conflict between appearance similarity and category membership, across all age groups many children experienced difficulty when resolving this conflict. More importantly, those children who successfully resolved the conflict between appearance similarity and category membership during the pre-switch phase, were markedly more successful in switching to sorting pictures by appearance similarity than to sorting by category membership.

The first finding goes against the notion that children can categorize objects or generalize object properties based on conceptual information when it conflicts with perceptual information (Booth & Waxman, 2002; Gelman & Markman, 1986; Gelman, 2003). At the same time, this finding adds to the growing body of evidence that when there is a strong conflict between multiple sources of information (e.g., linguistic labels and appearance similarity) 4- and 5-year-old children's performance on generalization tasks is not different from chance (Sloutsky & Fisher, 2004; Sloutsky, Lo, & Fisher, 2001).

The second finding provides direct evidence that children do not privilege conceptual information over perceptual information; rather the pattern of perseveration errors described above suggests that for young children, at least up to five years of age, perceptual information is more salient than conceptual information.

Another important aspect of the findings presented above is the fact that strong perseveration tendencies were observed in children older than three years of age. In previous research that used the switch paradigm, children older than three years of age rarely make perseveration errors in the DCCS task, unless the task is modified to increase working memory demands. For example, children may be asked to remember a pair of rules, such as "if there's a border, play the color game; if there's no border, play the shape game" (Zelazo, 2006, p. 300). Findings presented above suggest that task demands can be increased not only by making the rules more complex, but also by requiring children to switch from sorting by appearance similarity to sorting by category membership.

Overall, the present findings challenge the theoretical view suggesting that conceptual information takes precedence over perceptual information for children as young as two years of age (Booth & Waxman, 2008; Gelman, 2003). At the same time, these findings contribute to the mounting evidence suggesting that processing early in development is driven primarily by the low-level mechanisms of perception, attention, and memory, with conceptual knowledge emerging as a strong influence on cognition in the course of development and learning (McClelland, & Rogers, 2003; Rakison, 2003; Sloutsky, & Fisher, 2004; Sloutsky, 2003; Samuelson, & Smith, 2000; Smith, 2000).

Acknowledgments

We thank the parents, teachers, staff, and children at the Carnegie Mellon Children's School, ABCs for Children, Brightside Academy, Three Rivers Rochelle Street, Three Rivers Hazelwood, and Three Rivers Overbrook for their participation in this research.

References

Baldwin, D. A., Markman, E. M., & Melartin, R. L. (1993). Infants' ability to draw inferences about nonobvious object properties: Evidence from exploratory play. *Child Development*, 64, 711-728.

Berg, E.A. (1948). A simple objective technique for measuring flexibility in thinking. *Journal of General Psychology*, 39, 15-22.

Bomba, P. C. & Siqueland, E. R. (1983). The nature and structure of infant form categories. *Journal of Experimental Child Psychology*, 35, 294-328.

Booth, A. E., & Waxman, S. R. (2002). Word learning is 'smart': evidence that conceptual information affects preschoolers' extension of novel words. *Cognition*, 84, B11-B22.

Fisher, A. V. (2008). Automatic and voluntary shifts of attention in the Dimensional Change Card Sorting task. In. V. Sloutsky, B. Love, & K. McRae (Eds.), *Proceedings of the XXX Annual Conference of the Cognitive Science Society*, 469-474.

French, R. M., Mareschal, D., Mermillod, M., & Quinn, P. C. (2004). The role of bottom-up processing in perceptual categorization by 3- to 4-month-old infants: Simulations and data. *Journal of Experimental Psychology: General*, 133, 382-397.

Gelman, S. A. (2003). *The essential child*. Oxford: University Press.

Gelman, S. A., & Markman, E. (1986). Categories and induction in young children. *Cognition*, 23, 183-209.

Heit, E., & Rubinstein, J. (1994). Similarity and property effects in inductive reasoning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20, 411-422.

Huttenlocher, J., & Smiley, P. (1987). Early word meanings: The case of object names. *Cognitive Psychology*, 19, 63-89.

Jacques, S., Zelazo, P. D., Kirkham, N. Z., & Semcesen, T. K. (1999). Rule selection and rule execution in preschoolers: An error-detection approach. *Developmental Psychology*, 35, 770-780.

Jones, S. S. & Smith, L. B. (1998) How children name objects with shoes. *Cognitive Development*, 13, 323-334.

Koch, C. & Ullman, S. (1985). Shifts in selective visual attention: Towards the underlying neural circuitry. *Human Neurobiology*, 4, 219-227.

Malt, B.C. (1994). Water is not H2O. *Cognitive Psychology*, 27, 41-70.

McClelland, J. L., & Rogers, T. T. (2003). The parallel distributed processing approach to semantic cognition. *Nature Reviews Neuroscience*, 4, 310-322.

Murphy G. L. (2002). The big book of concepts. Cambridge, MA: MIT Press.

Nosofsky, R. M. (1984). Choice, similarity, and the context theory of classification. *Journal of Experimental Psychology: Learning, memory, & Cognition*, 10, 104–114.

Osherson, D. N., Smith, E. E., Wilkie, O, Lopez, A, & Shafir, E. (1990). Category-based induction. *Psychological Review*, 97, 185-200.

Quinn, P. C., Eimas, P. D., & Rosenkratz, S. L. (1993). Evidence for representations of perceptually similar natural categories by 3-month-old and 4-month-old infants. *Perception*, 22, 463-475.

Proffitt, J. B., Coley, J. D., & Medin, D. L. (2000). Expertise and category-based induction. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 26, 811-828.

Rakison, D. H. (2003). Parts, motion, and the development of the animate–inanimate distinction ininfancy. In D. H. Rakison & L. M. Oakes (Eds.), *Early category and concept development: Making sense of the blooming, buzzing confusion*, pp. 159–192. New York: Oxford University Press.

Rakison, D. H., & Poulin-Dubois, D. (2002). You go this way and I'll go that way: Developmental changes ininfants' attention to correlations among dynamic features in motion events. *Child Development,* 73, 682–699.

Rips, L. J., Shoben, E. J., & Smith, E. E. (1973). Semantic distance and the verification of semantic relations. *Journal of Verbal Learning and Verbal Behavior*, 12, 1 20.

Samuelson, L. K., & Smith, L. B. (2000-a). Grounding development in cognitive processes. *Child Development*, 71, 98-106.

Sloman, S. A. (1993). Feature-based induction. *Cognitive Psychology*, 25, 231-280.

Sloutsky, V. M. (2003). The role of similarity in the development of categorization. *Trends in Cognitive Sciences*, 7, 246-251.

Sloutsky, V. M., & Fisher, A. V. (2004). Induction and categorization in young children: A similarity-based model. *Journal of Experimental Psychology: General*, 133, 166-188.

Sloutsky, V. M., Lo, Y.-F., & Fisher, A. V. (2001). How much does a shared name make things similar: Linguistic labels and the development of inductive inference. *Child Development*, 72, 1695-1709.

Smith, L. B. (2000). Learning how to learn words: An associative crane. In *Becoming a Word Learner.* New York: Oxford University Press.

Smith, L. B., Jones, S. S., & Landau, B. (1996). Naming in young children: A dumb attentional mechanism? *Cognition*, 60, 143-171.

Treisman, A. M., & Gelade, G. (1980). A Feature-integration theory of attention. *Cognitive Psychology*, 12, 97-136.

Trick, L. M. & Enns, J. T. (1998) Lifispan changes in attention: The visual search task. *Cognitive Development*, 13, 369-386.

Underwood, G., Foulsham, T., van Loon, E., Humphreys, L., & Bloyce, J. (2006). Eye movements during scene inspection: A test of the saliency map hypothesis. *European Journal of Cognitive Psychology*, 18, 321-343.

Wisniewski, E. J. (1995). Prior knowledge and functionally relevant features in concept learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 21, 449-468.

Zelazo, P. D. (2006). The Dimensional Change Card Sort (DCCS): a method of assessing executive function in children. *Nature Protocols*, 1, 297-301.

Zelazo, P. D., Frye, D. & Rapus, T. (1996). An age-related dissociation between knowing rules and using them. *Cognitive Development* , 11, 37-63.