Does the Primary Intuitive Model of *Living Things* Persist in Adolescence?

Reuven Babai (reuvenb@post.tau.ac.il)
Department of Science Education, Tel Aviv University, Tel Aviv 69978, Israel

Rachel Sekal
Department of Science Education, Tel Aviv University, Tel Aviv 69978, Israel

Ruth Stavy
Department of Science Education, Tel Aviv University, Tel Aviv 69978, Israel

Background

Several studies in the past showed that young children, such as elementary school pupils, have difficulties in classifying objects as living or nonliving things. For example, it was shown that more than 40% of Israeli 2nd to 4th graders tend to classify plants as nonliving objects (Hatano et al., 1993). Moreover, inanimate objects that possess an autonomous motion were mistakenly regarded as living. Carey (1985) suggested that young children view objects as living based on the characteristic of movement. In addition, Opfer and Siegler (2004), reported that Preschoolers' concept of living things included capacity for goal directed movement as an important property of life. Moreover, Tamir, Gal-Chappin, and Nussnovitz (1981), found that junior high school students also regard movement as a major characteristic of living things. Most participants in their study believed that caterpillars change into pupa and then into butterflies, yet, viewed the pupa as being dead.

These findings suggest that the primary intuitive model of living things is based, at least in part, on the motion feature of the object. In the current research we studied whether this primary intuitive model of living things persists after formal learning of the concept of life in high school biology. In order to do that, we measured the accuracy and RT of students' responses to classification of objects belonging to different subcategories.

Methodology

Forty-nine high school students from Grade 10 (15-16 years old) participated in the study. All of them learnt the concept of living during their biology lessons in the 9th grade. Each of them completed the computerized *Living and Nonliving Classification RT Test*. During the test participants were asked to classify 77 grayscale drawings of objects, belonging to 11 groups, into living or nonliving. The living category included two subcategories: animals and plants. The subcategory of animals consisted of five systematic groups (mammals, birds, fish, reptiles and insects) and the plants subcategory included two groups (trees and open field flowers). The nonliving category included two subcategories: static objects and dynamic objects. The static objects consisted of two groups (tools and immobile landscape elements [such as mountain]) and the dynamic objects consisted of two groups (vehicles and celestial bodies [stars, moon etc.]).

Findings and Conclusions

Correct classification rate was very high for all subcategories, yet, the difference between animals and plants in the living category and between static and dynamic objects in the nonliving category, were statistically significant ($p<0.001$; Bonferroni post-hoc test, $p<0.005$ and $p<0.001$ respectively). In addition, significantly longer RT was observed in the living category for plants in comparison to animals as well as in the nonliving category for dynamic objects compared to static ones ($p<0.001$; Bonferroni post-hoc test, $p<0.001$ and $p<0.001$ respectively).

Table 1: Mean Rate and RT* of correct judgments (CJ).

Category	Subcategory	Rate CJ (*SD*)	RT CJ (*SD*)
Living	Animals	98.8 (2)	591 (128)
	Plants	93.5 (11)	681 (174)
Nonliving	Static	96.7 (6)	671 (122)
	Dynamic	91.7 (9)	830 (190)

* Mean RT (in MS) was first calculated for each participant for each group. Later mean RT of each subcategory was calculated by averaging the mean results of its groups, from all the participants.

Our results suggest that the categorization process is interfered by this primary intuitive concept that persists in adolescence. The longer RT for classification of the "problematic" subgroups might represent an effortful process needed in order to overcome this interference.

References

Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.

Hatano, G., Siegler, R. S., Richards, D. D., Inagaki, K., Stavy, R., & Wax, N. (1993). The development of biological knowledge: A multi-national study. *Cognitive Development*, *8*, 47-62.

Opfer, J. E. & Siegler, R. S. (2004). Revisiting preschoolers' living things concept: A microgenetic analysis of conceptual change in basic biology. *Cognitive Psychology*, *49*, 301-332

Tamir, P., Gal-Chappin, R., & Nussnovitz, R. (1981). How do intermediate and junior high school students conceptualize living and nonliving? *Journal of Research in Science Teaching*, *18*, 241-248.