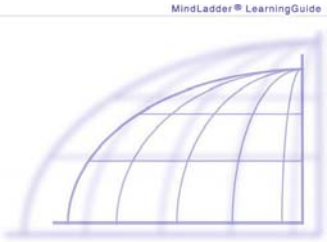

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R-5: Traces, Symbols and Signs

The essential feature of this knowledge construction function is the ability to use traces, symbols and signs as referents, or substitutes, of objects or events. Traces, symbols and signs all share the characteristic of pointing beyond themselves to something else. Traces are actual marks left by the passage of a person, animal or thing whether currently, recently or a long time ago. For example, traces of a human habitat, a bear, a volcano or a human conflict. Detectives often study traces intently. For instance, can a criminal's identity be inferred from a shoeprint at the scene of a crime? Symbols and signs are often confused. We speak of mathematical symbols such as + (add) and x (multiply) when speaking of signs would be more accurate. How do signs and symbols differ? Signs point by convention and can both be created and replaced by convention. Mathematical signs and traffic signs are examples. Signs do not participate in the reality they point to while symbols do. Unlike signs, symbols cannot simply be created by declaration or fiat. Symbols evolve not out of intent or convention but out of the individual and shared unconscious which accept them. Examples are national anthems, which may elicit strong emotional feelings for the nation they represent, the dove, which has become a symbol of peace, the heart-and-arrow which has become a symbol of love and the horseshoe which has become a symbol of luck. Americans recognize the eagle as a symbol of the United States.

The ability to use traces, symbols and signs is a pre-requisite for representational and abstract thinking and as such this knowledge construction function affects all aspects of the mental act. It is listed, however, at the receptive stage due to its particularly critical role in the identification and decoding of information. Traces, symbols and signs are the building blocks for all knowledge that is not based on direct experience.

Students may not secure information from one or more types of substitutes until they develop this function: The student does not ponder the human from the bitemarks in the cheese, from the footprint in the sand or from the candy wrapper on the tabletop (traces). The student does not infer the country from its flag (symbol) or the possibility of crossing deer from the silhouetted deer on the road sign in the forested area (sign). The image of a feline is not conjured up from letters shaped and sequenced, in English, like c - a - t (signs). Difficulties with this knowledge construction function strongly impact the development of language, especially reading and writing, and compromise the understanding of math whereby signs are used to represent different entities and operations.

To mediate this function, start out with looking at traces. Students often develop a keen interest in traces once they are connected with hypothetical (T-11) and inferential thinking (T-17). How can we tell the cat was lying on the sofa? What can we tell about the weather from looking at the floor in the classroom? What can we tell from the tire track in the ground? Can we tell perhaps how long ago the vehicle passed by? Is it possible to tell if it was heavily loaded? Then go on to study symbols. Does the school have a symbol? Do sports teams have symbols? What are the symbols of the nation (flag, anthem)? Do you know a symbol for love? Students can study symbols belonging to different cultures that may be represented in the classroom. They can study symbols from different times in history. Some symbols may evoke pride and joy, such as the Statue of Liberty, while others, such as the swastika, may evoke fear and hatred. Then move on to study signs. Students can study signs and explore how they enable information to be recorded and communicated with high levels of efficiency (traffic signs, icons in public places or on consumer products). Use exercises where students develop their own system of signs or alphabet. They do not have to be elaborate to get the point across. Have them use their system or alphabet to create simple propositions or statements or to translate statements from their normal language into their language. Have students look at body language and how it is used to convey meaning (see also C-1).

As you develop this knowledge construction function your students develop an awareness that all knowledge relies upon traces, symbols and signs. They begin to understand that all knowledge is constructed from these simple building blocks. In this way they learn to anticipate and look out for the traces, symbols and signs that may be special to each new academic area they will learn about.