Newton's Law of Cooling, Revisited

Recall the situation we modelled previously. A cup of hot water is cooling to *ambient temperature*, A. We found our ambient temperature to be 3.5° C.

Purpose of the Model:

Predict the temperature of the water, $H(t)$ at any time t.

Understand the processes involved in cooling.

Assumptions: The temperature of the ambient environment (water bath and surrounding air) remains constant.

(1) How well did our model "fit" the data we obtained? (Remember the graphs?)

(2) What assumptions built into the model may be incorrect and explain the discrepancy with the data?

Modifying the Model: Let's write down in English and in Math our thinking about the new version of the model for cooling. Let $B(t)$ be the temperature of the ice bath and $A(t)$ be the temperature of the air.

ENGLISH: Rate of change in temperature of the water is related to interaction with the ice bath and interaction with the air.

MATH:

ENGLISH: Rate of change in temperature of the air is related to interaction with the water and interaction with the ice bath.

MATH:

ENGLISH: Rate change in temperature of ice bath is negligible.

MATH:

Diagram: We can draw a diagram depicting the relationships between the quantities of interest.