



DIVERGENT THINKING: MORPHOLOGIES

OVERVIEW

Morphological thinking was first introduced by Fritz Zwicky, an astrophysicist, as a way to categorize and consider “all possible alternatives” within a particular system or problem. Morphologies can help students in the brainstorming phase through forcing associations that they would not normally make, and to take risks in their thinking through short, iterative exercises. Alternatively, they are also good for pulling apart a problem and looking at each element of it in isolation as well as combination.

DIVERGENT THINKING ACTIVITIES

Morphologies for Forcing Associations

The purpose of this type of morphology is to force associations between two aspects of a given problem. It is particularly helpful when encouraging students to generate new ideas or concepts related to an existing problem. For example, if students are creating a public service campaign for the state with the lowest vaccination rates, a morphology could help brainstorm the themes for the campaign.

Create a 3 x 3 matrix. Along the vertical axis prompt students to list 3 components of the problem. In the example below, this axis lists 3 of the most common misperceptions about vaccinations. Along the horizontal axis, identify an alternative component to the problem, argument, or potential solutions—in this example, the most important arguments FOR encouraging vaccinations. At the intersection of those two points, students can then brainstorm titles for their

	Public Safety	Life-Saving	Save Time and Money
Overloaded Immune System	There's no such thing as too much. Immunization protects us all.	There's no such thing as too much. Immunization protects you.	There's no such thing as too much. Immunization saves you time and money.
Disappearing Diseases	They're still out there. Immunization protects us all.	They're still out there. Immunization protects you.	They're still out there. Immunization saves you time and money.
Harmful Side-Effects (i.e. Autism)	There is no link to autism: Immunization helps us all.	The only side-effect is protection: Immunization keeps you safe.	The only side-effect is protection: Immunization saves you time and money.

READINGS & RESOURCES

Zwicky, Fritz. *Discovery, Invention, Research through the Morphological Approach*. Macmillan, 1969.

Watts, Linda and Blessinger, Paul. *Creative Learning in Higher Education: International Perspectives and Approaches*. Routledge, 2016.

See also: **Lateral Thinking: Analogies and Associations** at <https://think.dasa.ncsu.edu>

campaign that addresses these two issues. You can prompt them to create really diverse ideas or to compare more nuanced differences in language (as shown in this example). Students can then take the most relevant ideas and combine them into a more complex solution or argument. Morphologies can be used again and again to brainstorm on more and more specific pieces of the topic or assignment.

Morphologies for Breaking Down Ideas

Morphologies can also be good to test knowledge of the various stages or steps of a topic, as well as to pull apart different qualities to look at them in isolation and/or combination. For example, a leaf morphology might identify separately the unique qualities of a leaf—venation, edges, and general shape—and place one along a horizontal axis, one along a vertical axis, and even one along a secondary horizontal or vertical axis. Students can then configure and combine those qualities as they relate to a specific context—whether it's a tree type, an environment or region, or something else.