Commentary on: Michel Dufour’s Argument and Explanation in Mathematics

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How are explanations, proofs, and arguments related?
How explanations, proofs, and arguments are related according to conventional wisdom
How explanations, proofs, and arguments are related according to the challengers
Some Varieties of Explanation

1. **Reasoning trace explanations**: ... explain why a conclusion was reached, or a decision made, by describing the reasoning steps that led to the conclusion. ...

2. **Strategic explanations**: rather than explaining a result by listing rules used, these explanations describe the strategy employed by the problem solver. Strategic explanation give the user an insight into the problem-solving methodology.

3. **Deep explanations**: deep, or model-based explanations *justify* system results by linking them to a deep, causal model. Thus, deep explanations attempt to give the underlying reasons for an action or state.

Explanation and Explication

1. The explicatum [the thing which explicates] is to be similar to the explicandum [the thing requiring explication] in such a way that, in most cases in which the explicandum has so far been used, the explicatum can be used; however, close similarity is not required, and considerable differences are permitted.

2. The characterization of the explicatum, that is, the rules of its use (for instance, in the form of a definition), is to be given in an exact form, so as to introduce the explicatum into a well-connected system of scientific concepts.

3. The explicatum is to be a fruitful concept, that is, useful for the formulation of many universal statements (empirical laws in the case of a nonlogical concept, logical theorems in the case of a logical concept).

4. The explicatum should be as simple as possible; this means as simple as the more important requirements (1), (2), (3) permit.