

# Beyond Physics to Other Subjects: A Case for Transfer

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## Introduction

Studies of transfer where individuals learn something in a particular context and apply it to another subject have often shown that humans have difficulty making applications where the two contexts are very different (see, for example, Detterman, 1993). Furthermore, although the number transfer studies in both the educational and psychological domains are quite numerous, the number of studies that focus on very distant transfer is quite small (Barnett & Ceci, 2002). Even though transfer in general and far transfer in particular have often proven difficult to observe within the laboratory, it remains a core process in cognition and a foundational reason for the practice of formal education.

The present study investigated whether and by what processes individuals engage in far transfer

## Method

A case study was carried out with a male undergraduate physics major who claimed that he used physics to “understand other subjects.” Using Protocol Analysis (Ericsson & Simon, 1993), three interviews and a journal entry task were performed in an effort to expand and qualify the participant’s initial statements. Barnett and Ceci’s (2002) Taxonomy for Far Transfer, Lobato’s (2003) Actor Oriented Transfer and Bransford and Schwartz’ (1999) Preparation for Future Learning framework were used to create a list of 12 aspects of transfer from which the participant’s statements could be analyzed.

## Results and Discussion

In the first interview and journal entry task the participant described six different examples in which he used ideas from physics to help him understand other subjects, including philosophy, social science, German, music and psychology. Taken together, each example provided evidence of the situational and dynamic nature of transfer when analyzed according to the 12 aspects of transfer listed below.

The second interview focused on one of these examples with questions intended to more fully uncover each aspect of transfer. The particular example involved comparing Heraclitus’ concept of flow with principles of quantum mechanics. One particularly interesting finding, amongst others, was that although social interactions helped to generate initial transfer, the subsequent development of the connection was largely done individually.

The third interview focused on the motivation for transferring between physics and other subjects. Many answers were based on an epistemic belief that all types of knowledge are highly integrated. This raises the question as to whether this belief should be preferred to promote transfer.

Table 1: Twelve aspects of transfer.

Content
Learned Skill
Performance Change
Memory Demands
Context
Knowledge Domain
Temporal Context
Functional context
Social Context
Modality
Value
Direction of Transfer
Positive or Negative Transfer
Passive or Active Transfer
Relations of Similarity

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