

# The Inevitability and Necessity of Interdisciplinarity

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Ghost in the Machine -  
Autumn Term 2021  
Date: 04 January 2021

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### **Abstract**

This article was intended to explore whether or not interdisciplinarity was inevitable, and why it is one of the most important insights about the nature of the mind. Without an interdisciplinary approach, our understanding of the mind would be far less. Cognitive science is fundamentally interdisciplinary and there is good reason for this, such as the impact of the scale of cognitive science which this article discusses. The article also explores some of the key features of interdisciplinarity and why they are useful to the field of cognitive science, as well as some of the reasons some studies aren't interdisciplinary.

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# 1 Introduction

The complexity of the human mind and the scale of cognitive science as a whole meant interdisciplinarity was inevitable. The scale of cognitive science is in part due to the fact there are so many different ways of looking at the mind (from multiple levels and perspectives), as well as there being so many different aspects to the human brain. However, interdisciplinarity has several benefits, such as the use of critical thinking from other disciplines and the use of multiple analytical tools and methods. Interdisciplinarity also encourages theorists to develop studies from other disciplines, further contributing in the pursuit of *a unified Theory of Cognition* (Bermúdez 2019). Unfortunately an interdisciplinary approach is not always used, the reasons for which will be discussed in this article along with all of the topics mentioned in this introduction.

## 2 Key Characteristics of Interdisciplinarity

A very good reason for a study to use an interdisciplinary approach is that *having an interdisciplinary approach allows theorists to draw different conclusions from a single study to ensure the correct determination is made, hence used in future studies* (Matthews 2020). This can be the case for several reasons, three of which will be explored in further detail in this article: critical thinking, analysis and theory development.

### 2.1 Critical Thinking

Having multiple disciplines discuss and criticize a study can provide alternative approaches or theories which the original study did not consider due to the scope of the study or simply because the theorist didn't think of these alternatives. A good example of this is the Russian Room Argument, developed by John Searle. It takes the Turing Test theory and questions the plausibility of parts of the theory; specifically, Alan Turing stated that '*a machine that responds in exactly the way that a human being responds thereby counts as intelligent*', which encouraged further discussion on the topic.

### 2.2 Analysis

*Different branches of Cognitive Science employ tools appropriate to the level of organization at which they are studying in the brain* (Bermúdez 2019). For example, Tolman and Honzik ran a few groups of rats through a maze to test for reinforcement and conditional learning. This experiment was carried out over a couple of weeks, whereas for a study on neural events in the brain (which last for around one second) you need to use tools and develop experiments which take a much shorter amount of time. In their respective disciplines though, these experiments are considered accurate (and rightly so) despite them having very different time scales.

Another important point to consider when thinking about the techniques and tools used for analysis by the different disciplines, is the limitations on certain methods. A discipline that uses completely different methods for determining the accuracy of an experiment may look at a study from another discipline and agree, disagree or agree with parts of the theory. If they agree with the study then this can have positive outcomes for the study, which we will discuss in the next section.

## 2.3 Theory Development

Studies which can tie theories or studies from other disciplines together which weren't necessarily developed with this in mind, tend to gain support from many more theorists. This is because they are able to trust the study and the methods used, as the supporting study uses the same tools and the same ways of thinking as themselves. This is likely to produce more developed theories and further propositions to explore and discuss between the disciplines. The more disciplines that agree with a theory, the stronger that theory is likely to be, as it has been analysed and tested from several different levels and angles.

## 3 Difficulties of Working with an Interdisciplinary Approach

Why don't all studies work with an interdisciplinary approach? Well, there are several reasons, but mainly because it can be quite difficult. This is because disciplines can vary in what they seek to achieve and the answers they are looking for can quite often be different and specific. Another large factor is something that was briefly mentioned in the previous section, which is the use of methods for analysis and testing. If one of the disciplines believes the method of measuring an experiment isn't accurate, they won't be able to develop any of the conclusions made from that experiment or tie their own studies to it.

This difficulty of interdisciplinarity is also highlighted when considering *the differences in epistemology and hence in specific methods, notions of adequate proof, and other fundamental assumptions of different fields* (Lélé and Norgaard 2005). For example, one discipline might use a previous theory to support or base their own study on, and if the assumptions taken from that theory aren't recognised by the other discipline, the study cannot be seen as reliable to them. If none of the studies and experiments in cognitive science tried to find links and comparisons between them and other disciplines, then the field of cognitive science would never reach a definitive unified explanation of how the human brain and mind works which is what it is aiming to achieve; and this is what the next chapter will explore.

## 4 The Scale of Cognitive Science

There are so many different parts and aspects to the human brain which are yet to be explored, despite experts doing so for over 60 years. With such a huge field of science, there comes a need for a vast number of studies and experiments in order to understand how the brain works and functions. *The mind is too complex a phenomenon to be fully understood through a single discipline or at a single level* (Bermúdez 2019). This is partly because of the abstract nature of the mind. The impacts of having different levels will be discussed in this chapter, as well as the impact of the sub-sections within the main disciplines of cognitive science.

### 4.1 The Impact of Levels

Studying the brain and the behaviour of humans and animals at different levels, has helped us develop a good understanding of how the brain passes information and operates from an information processing point of view; as well as having helped different disciplines find links between their studies. But the introduction of levels has also created many more areas and approaches which need to be explored; *for example at the functional level, at the level of neural networks in the brain, or at the level of biological or cultural evolution* (Colombo and Knauff 2020).

Having different levels is very useful when looking at the mind as it's not something we can physically dissect or hold in our hands. It can only be observed and monitored through a few methods, such as brain activity and human behavior. This makes it difficult to prove facts about the mind, and theorists can only make assumptions and use those as *known* facts (or truths) and as we discussed previously, disciplines have different *known* facts. Disciplines also have sub-sections within them, which is discussed in the next section.

### 4.2 The Impact of Sub-Sections

Within the different disciplines of cognitive science, there are further separate branches. Take psychology for example, it can be broken down into many more sub sections such as cognitive and behaviourist psychology, or from an evolutionary perspective compared to a biological perspective. These sub-sections themselves don't always agree on topics, and explore different aspects of Cognitive Science. One sub-division wouldn't necessarily be able to provide an answer to the science of cognition, just as psychology as a whole wouldn't be able to, as it is just one discipline out of many and is looking at a relatively small part of a massive field.

## 5 Conclusion

The complexity of the human mind and the scale of cognitive science as a whole means no one discipline can fully explain it, so interdisciplinarity is essential. There are far too many levels and aspects for one disciplines' approach, so the scale of cognitive science means interdisciplinarity was inevitable. But this isn't consequently a bad thing; this in fact enables several beneficial products of interdisciplinarity, such as the use of critical thinking from other disciplines and the use of multiple analytical tools and methods. Interdisciplinarity also encourages theorists to develop studies from other disciplines, further contributing in the pursuit of *a unified Theory of Cognition* (Bermúdez 2019).

## References

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