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A revelation in colour and sound

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It can sometimes be tempting to teach physics concepts in isolation, as if they exist in a vacuum. I find, however, that making the extra effort to integrate interdisciplinary connections heightens students' interest and can lead previously uninterested students to the realization that physics is 'cool'. I (MJR) would like to share an illustration of the benefits of interdisciplinarity that occurred in my course on 'The physics of sound and music' for the general student. In discussing the perception of sound, I mention synaesthesia, the overlapping of senses, which, for example, gives some people the ability to perceive colour when they hear sounds. When I covered the topic one day, a student in the class (LZJ) discovered, for the first time in her life, that she had synaesthesia. Here is her account, in her own words, complete with a figure she prepared that displays the letters of the alphabet and the associated colours she perceives for each letter.

'Until it was brought to my attention one baffling day in Dr Ruiz's class of about 100 students that not everyone sees the names of days, months, the alphabet and numbers in their own, specific colours, I had never consciously examined that I do. But as Dr Ruiz started telling us about a condition called synaesthesia, in which a person may see numbers and letters in colour, hear musical notes in colour, or even feel physical sensations when hearing musical notes, I was stunned that this concept seemed unfamiliar to the other students. While I have never had this experience with music, for me, numbers, letters, days and months are all associated with colours in my mind's eye – and they always have been. More accurately, it is a feeling of specific colours, but I have found this much too hard to explain to a non-synaesthete. Watching my classmates react to the idea of synaesthesia with confusion and interest, I felt completely lost. Had I missed something? What was everyone amazed by? I became self-conscious as I realized that while my mind perceives just about everything in colour, others live in a much less colourful world. The students around me were asking the question: "You mean there are actually people who see these colours without choosing to?" I wanted to stand up and scream: "You mean there are people who do not!?"

'Imagine you had six fingers and lived in a place so cold that everyone always wore mittens and never took them off. Then suppose one day it suddenly got warm and everyone removed their mittens, and you realized that other people only had five fingers. It would have never occurred to you before that maybe your hands were different; why would you ever ask anyone, "So how is your sixth finger doing today?"

'For me "A" is red, "B" is a deep pink and "E", "F" and "G" are three different shades of green. "L" is purple, "M" is red, "N" is orange-red and so on. Words generally follow the letter they start with – so "love", "luck", "laugh", "line" and "lord" are all purple. The word "lace", however, is white and I absolutely cannot explain why. Trying to describe the way letters, numbers, days and months are present in specific colours in my mind to my classmates was an exercise in frustration that day. "No," I kept saying, "I do not assign the colours, each letter just is a colour".

'How could I not have known that something so fundamental about myself was so different from other people? It truly is weird to suddenly learn new information about your-

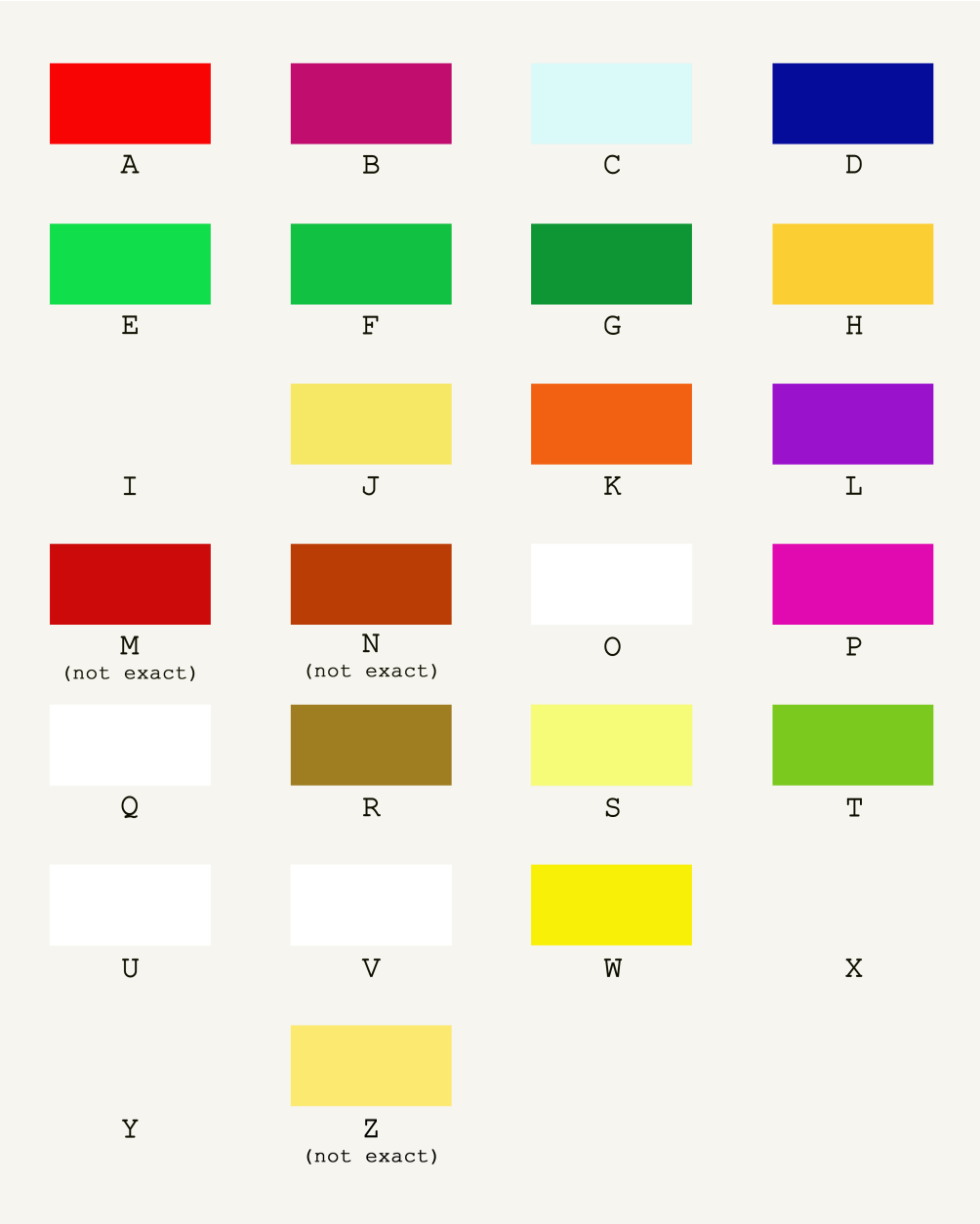

Figure 1. How Lydia perceives each letter of the alphabet in colour. Note that the colours for I, X and Y blend in with the background colour.

self, intimate information, without seeking it out. It is even weirder to discover this information in a physics class. The answer, of course, is that saying, "Hello. My name is Lydia. What colour is your five?" is an awkward icebreaker. It had just never come up.'

If I (MJR) had never incorporated the topic of synaesthesia into my class, this amazing learning experience would never have occurred. While one cannot expect such moments to happen every day, this event is a powerful example of the potential benefits of frequently making interdisciplinary connections.