Firstly, we are pleased to read that both authors (Schumayer and Scott 2016) agree with us about the importance of research into how students think about novel situations. The second point that we would make is that the main purpose of our article was to consider how students reason in novel situations with our main finding being that students’ ideas are best understood not as being theoretically grounded but rather as spontaneous constructions based on analogies which, in turn, are derived from their prior knowledge and experiences.

The authors of the letter take issue with our claim that the students had ‘erroneously predicted’ the outcome claiming this to be misleading. We would suggest that such a prediction was indeed erroneous, in the sense that it is in conflict with the scientifically correct prediction. Despite being erroneous we articulated why such erroneous predictions were made and how everyday experience, from which students draw analogies, can lead to such erroneous predictions. To claim that such a predication was not erroneous would be scientifically incorrect.

With regards to the second situation we are surprised that the authors disagreed with answer B. Whilst the motion is indeed harmonic the amplitude of the oscillations will, unless the transfer of gravitational potential energy into kinetic energy and vice versa is 100% efficient, decrease over time with the object eventually coming to rest at the centre of the Earth. For a more detailed analysis of this situation in terms of the scientific answer please see Fotou (2014) in appendix C.

We of course recognise that this is a significant simplification in the sense of how a tunnel could be constructed and the extremes of temperature etc. The issue was not to focus on the simplification but on how the students, presented with a novel situation, perceived the problem and the analogies that they drew on to make their predictions. After getting the answer we then probed why they gave the answers they did and in many cases their answers were best understood as arising from spontaneous reasoning by analogy to everyday experiences.

We would emphasise that these situations were designed and presented in a manner that was accessible to students aged from 10 to 17 and, as such, a high degree of simplification is necessary. Despite all of the simplifications what emerges is that many students drew on the same or similar analogies because they saw a...
similarity between the novel situation and other
everyday experiences with which they were very
familiar.

References
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