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Diego de la Hera

31 may 21



## Workshop plan:

- Introduction (15'):
  - reference managers
  - Wikidata
  - Cita
- Demo (15')
- Exercise (15')
- Cita's future (5')
- Q&A (10')



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ARTICLE OPEN

# Social interaction and conceptual change pave the way away from children's misconceptions about the Earth

Diego Pablo de la Hera<sup>1,2</sup>, Mariano Sigman<sup>1,2</sup> and Cecilia Ines Calero<sup>1,2</sup>

Throughout development, children undergo moments of abrupt conceptual transitions, often replacing intuitive knowledge with grounded scientific theories. This typically also creates a situation of social conflict, as different children may hold at the same time substantially different theories and explanations about the same phenomenon. The main objective of this work is to understand whether social interaction and exchange of arguments and reasoning may be a catalyzer for conceptual development. Dyads of 7-year-old children with different conceptual understanding of the Earth were asked to reach a consensus about its astronomic and geometric properties. Our results show that mere minutes of deliberation can result in substantial changes in children's conceptual representations, and moreover, that this transition was consistently in the direction of reasoned and scientific opinions. These results provide empirical evidence and suggest specific ways in which peer interaction can be used effectively to promote conceptual change in school settings, in a knowledge domain at the center of this era's post truth and science denial crisis.

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## INTRODUCTION

People often have different and contrasting knowledge and opinions. Science is no exception, and a variety of theories and interpretations are usually available for one same matter. How groups solve conflict and disagreement that result from these

From infancy, children have intuitive understandings of how the world works including, for example, elementary notions of physics, mathematics and social entities.<sup>1,2,3</sup> These general intuitions, partly built on everyday experiences, often collide with scientific knowledge.<sup>1,4-20</sup> The majority of researchers agree that they form

some 1's conceptual axes, which are more closely related to previously described mental models of the earth,<sup>21</sup>  $r(82) = 0.65$ ,  $p = 3.49E-11$ . A quantitative analysis using the Shapiro-Wilk and Hartigan's dip tests respectively rejected both normality ( $W = 0.93$ ,  $p = 1.27E-04$ ) and unimodality ( $D = 0.09$ ,  $p = 6.26E-06$ ) for average axis scores, whereas not for average dimension scores ( $W = 0.97$ ,  $p = 0.058$ , and  $D = 0.03$ ,  $p = 0.840$ , respectively), which also showed less saturation (Fig. 4b). This indicated that dimension scores provide a measure of conceptual knowledge that is more suitable for assessing knowledge level differences in the sections below.

Score differences between members of a dyad, i.e., between Children M and L (knowledge level gap:  $\Delta_{ML}$ ), were calculated for each dimension and then averaged:

$$\Delta_{ML}^k = \left( \sum_{i=1}^n d_i^M - d_i^L \right) / n, \quad (1)$$

where  $\Delta_{ML}^k$  is the score difference between Children M and L of the  $j$ th dyad in interview  $k$ ,  $n$  is the total number of dimensions ( $n = 11$ ), and  $d_i^M$  and  $d_i^L$  are the  $i$ th dimension score for Children M and L, respectively. Score differences between Interviews 1 and 2 of one participant (knowledge level shift:  $\Delta_{12}$ ) are calculated analogously:

$$\Delta_{12}^k = \left( \sum_{i=1}^n d_i^1 - d_i^2 \right) / n, \quad (2)$$

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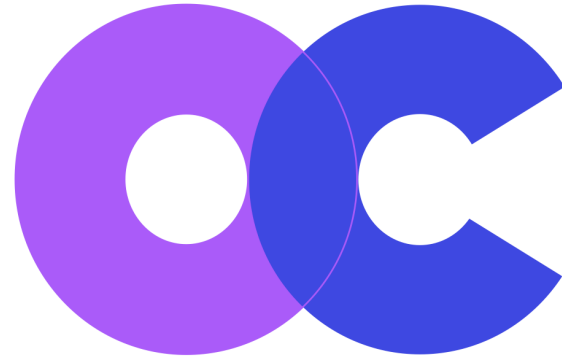
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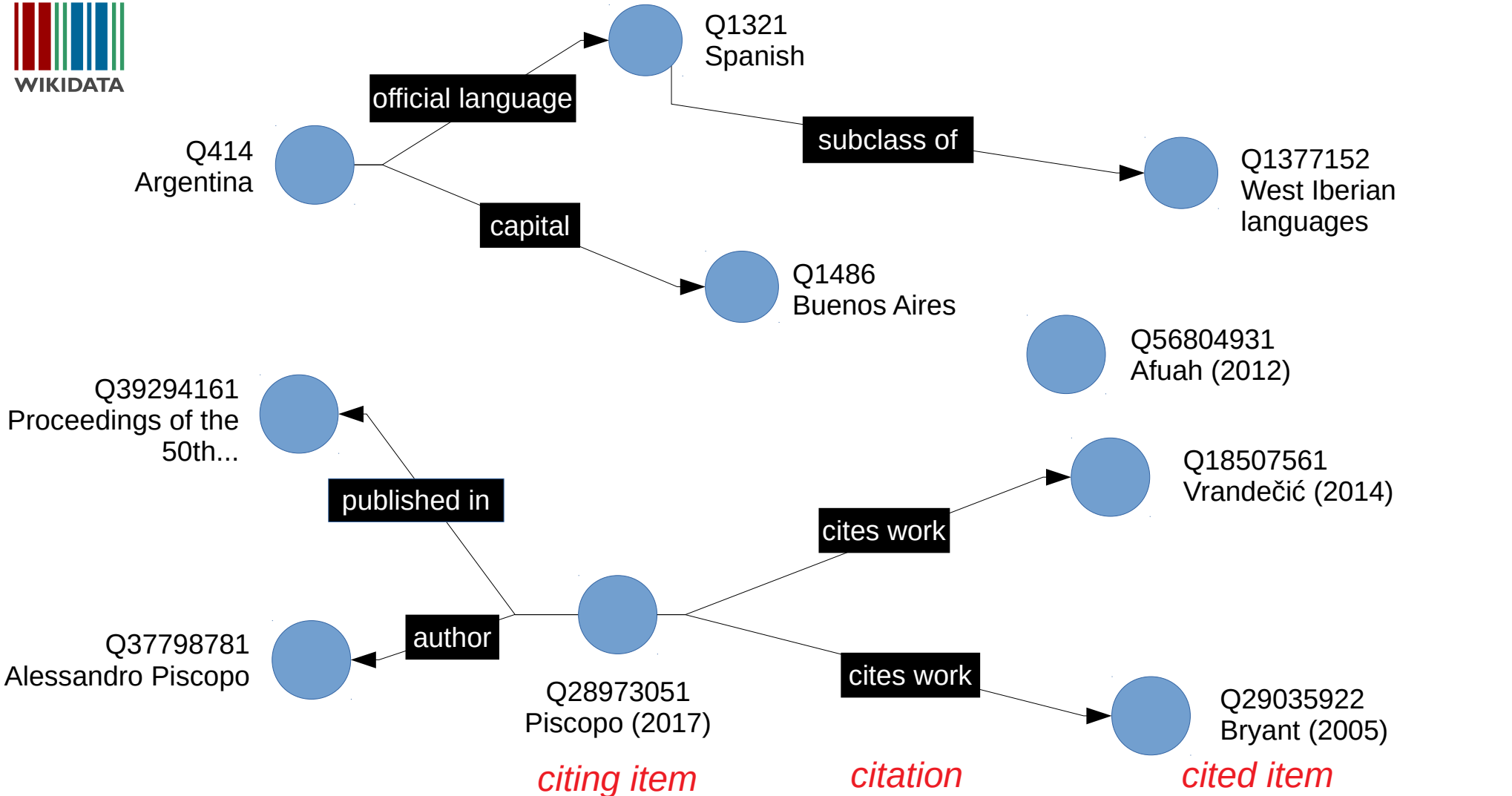
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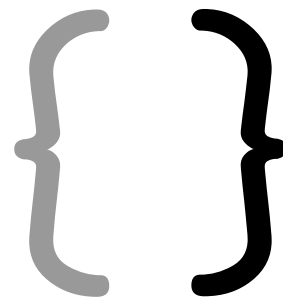
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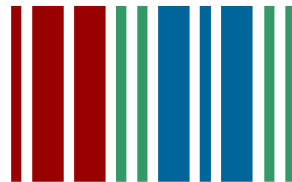
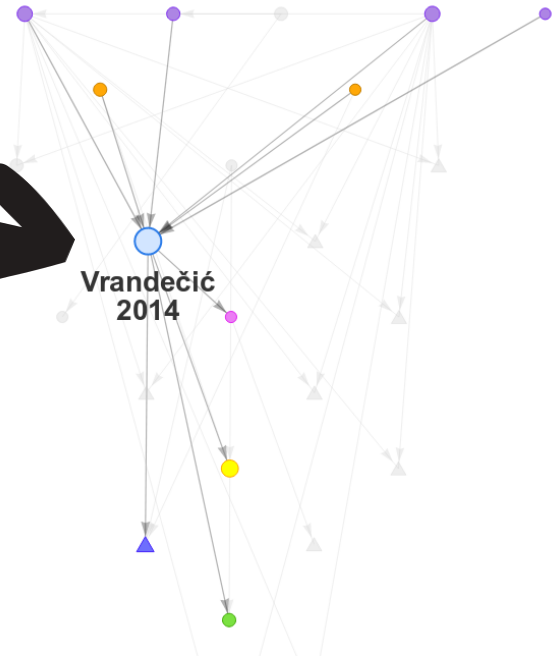
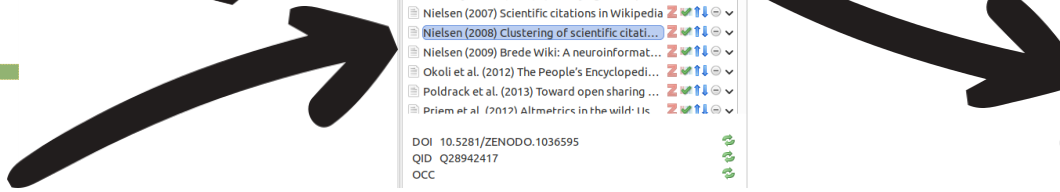
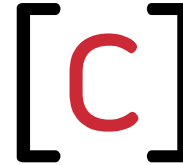
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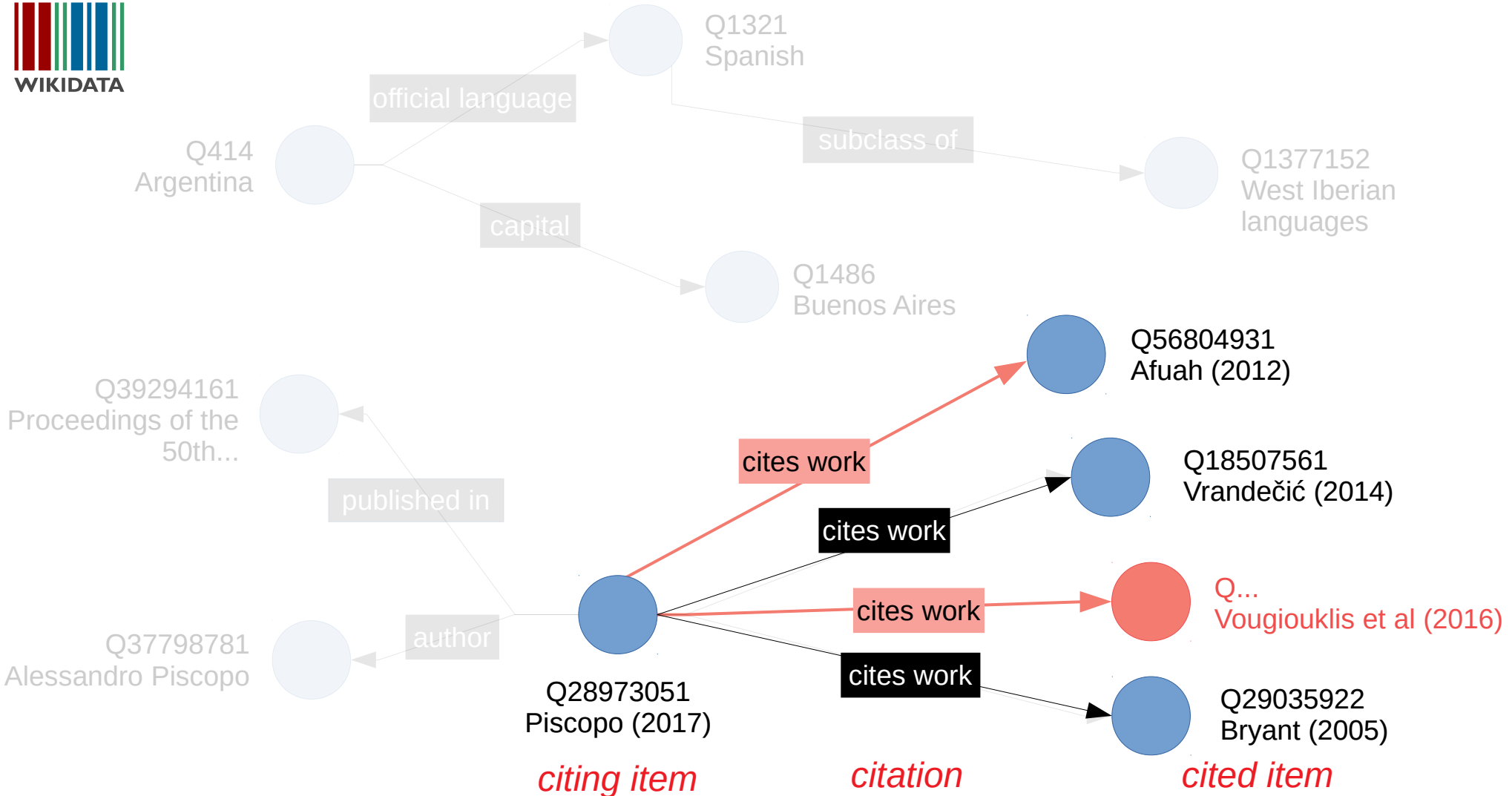


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# Demo



# Exercise

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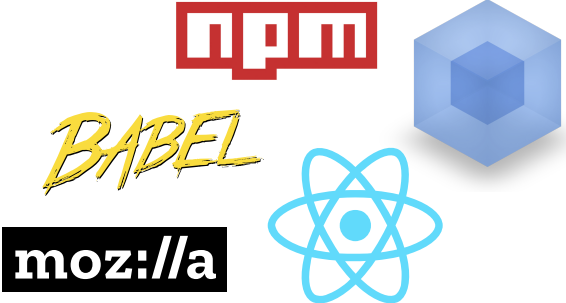
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