Verisimilitude Meets Epistemic Entrenchment

Zwart, Sjoerd D.; Renardel de Lavalette, Gerard R.

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Sjoerd D. Zwart
Department of Philosophy
University of Amsterdam
Nieuwe Doelenstraat 15
1012 CP AMSTERDAM
e-mail: s.zwart@hum.uva.nl

Gerard R. Renardel de Lavalette
Department of Computing Science
University of Groningen
P.O. Box 800
9700 AV GRONINGEN
e-mail: grl@cs.rug.nl

Verisimilitude

The hypothetical–deductive method lacks an explanation of scientific progress, and Popper proposed his theory of verisimilitude to fill this gap. The overall idea was to show that the critical method, i.e. proposing daring hypotheses to explain the relevant phenomena, and subsequently putting them under the severest possible scrutiny, will eventually lead to better theories. Popper's verisimilitude definition, however, failed since it could not compare two different false theories. The non-problematic and basic clause of Popper's definition reads $\varphi \leq^{+} \psi$ iff $\varphi \vdash \psi \vee \tau$, and we work with the extension of this basic clause, $\leq^{\mathsf{v}}_{\tau}$, developed by the first author in [1, Ch.6]. The theory of ψ, $Cn(\psi)$, is, regarding the true theory $Cn(\tau)$, at least as verisimilar as $Cn(\varphi)$ iff $\psi \leq^{\mathsf{v}}_{\tau} \varphi$. To answer the epistemic question of verisimilitude we turned to the theory of belief revision; and, without any premeditation, it turned out to fit very well to the refined verisimilitude definition.

Belief revision

Eschewing any reference to the concept of truth whatsoever, belief revisionists focus on the revision $K * \varphi$ of a deductively closed belief set K in the light of φ. This is simply $Cn(K \wedge \varphi)$ if $K \wedge \varphi$ is consistent, and otherwise $K * \varphi := Cn(K^{-} \wedge \varphi)$ for some $K^{-} \subseteq K$ with $K^{-} \nvdash \neg\varphi$. It is well known that for any K, K^{-} may be defined in terms of an *epistemic entrenchment* relation $\leq^{\mathsf{e}}_{K}$ on K, where $\chi \leq^{\mathsf{e}}_{K} \psi$ mirrors the willingness of the believer to give up χ and keep ψ, rather than give up ψ and keep χ; that is: ψ is *epistemically more entrenched* than χ. E.g. let $K := Cn(p \wedge \neg q)$, $\tau := Cn(p \wedge q)$, $\varphi := p \leftrightarrow q$ and $p \leq^{\mathsf{e}}_{K} \neg q$, then $K * \phi := Cn(\neg p \wedge \neg q)$ is less verisimilar then K. This revision shows that updating with *true* information may lead us *away from the truth.*

The main result

Our main result reads as follows. If for some K, the orderings $\leq^{\mathsf{e}}_{K}$ and $\leq^{\mathsf{v}}_{\tau}$ are similar (in some natural sense) and φ is true (i.e. $\tau \vdash \varphi$), then the new theory $K * \varphi$ is at least as close to the true theory $Cn(\tau)$ as the original theory K, i.e. $K * \varphi \leq^{\mathsf{v}}_{\tau} K$. In other words, the mechanism of our conceptual framework guarantees that updating with true evidence results in a theory that is at least as close to the truth as the original theory, *provided* that the epistemic entrenchment relation and the verisimilitude ordering of the sentences of the old theory coincide. Thus, under the proviso mentioned, and in Popperian spirit, updating with true information will us lead closer to the truth.

References

[1] Sjoerd D. Zwart, *Refined Verisimilitude.* Kluwer Academic Publishers, 2001.