

**INCREDULOUS SCANDINAVIANS:  
AN AGENT-BASED MODEL OF THE SPREAD OF SECULARISM**

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**ABSTRACT**

Here we describe an agent-based model of secular and religious worldview changes, the computational architecture of which is grounded in literature on the role of *credibility enhancing displays* (CREDS) in shaping the prevalence of supernatural beliefs in a population. Other methods have demonstrated that individuals who experience high exposure to religious CREDS are more likely to report religious beliefs and affiliation later in life. In contexts lacking in religious CREDS, religious worldviews tend to diminish over time. Agents are initialized with a variable *worldview*, ranging along a naturalist-supernaturalist continuum, and personality variables that influence preferences for joining secular or religious worldview groups. Both worldview and membership can be impacted by the intensity and consistency of CREDS in the environment. Our model explores the conditions under which religion fades within an artificial society that is designed to simulate contexts such as those populated by inCREDulous Scandinavians.

**1 INTRODUCTION**

The causes of the secularization in Western countries have been hotly debated in recent decades. We will present a computational model of CRED (credibility enhancing display) theory, which drives one of the most popular research programs in the cognitive science of religion. CRED theory was originally proposed by Henrich (2009) as an evolutionary cultural theory of beliefs, and has been expanded and tested by other scholars (Wildman and Sosis 2011; Lanman 2012; Willard and Cingl 2017). According to this theory, people are more likely to acquire and maintain a religious belief held by other individuals around them if those individuals behave in ways consistent with that belief. Our model implements the relevant agent interaction dynamics proposed by CRED theory, but also applies these dynamics to the transmission of secular (or non-supernatural) beliefs.

**2 AGENT VARIABLES AND INTERACTION RULES**

Our starting point was a previous agent-based model, SETI, designed with the goal of mimicking the conditions and mechanisms leading to the structural, social, and cultural integration of minorities into large Western societies. SETI represents an artificial society with structural (employment, income, education) and demographic (marriage, reproduction, life expectancy) variables typical of Westerns countries. In it,

agents attend school, obtain/lose jobs, get married and reproduce. To develop the CRED model, we added variables to SETI that allowed individuals to hold religious or secular *worldviews* (from secular to religious on a continuum [0,1]); and to join or leave worldview *clubs* (religious or secular). Worldview clubs are membership organizations that exist to support people having specific types of *worldview* and to advance those *worldviews*; each club has a leader. When an agent belongs to a worldview club, the agent's personal *worldview* variable tends to match the worldview of the club. Further, we also endowed agents with personality, the HEXACO factors plus other personality features such as *charisma*, *susceptibility*, *frustration* and *hypocrisy tolerance*. Personality variables (HEXACO) affect the agents' initial *worldview*, their tendency to join and leave clubs, and on the consistency and magnitude with which they display CREDs.

On initialization, agents are assigned variables drawn from suitable distributions. They attend school for at least 16 years after which they move into the work force. Agents die with a certain probability or if they reach their life span. Agents may get married after reaching an age threshold. To get married, agents must satisfy *age*, *education*, and *worldview* compatibility conditions related to their potential partner. Once married, agents may have children; newly born agents inherit the HEXACO personality traits of their parents. Other personality traits such as *worldview*, *charisma*, *susceptibility*, *frustration*, etc., are derived from the inherited HEXACO personality values. On a weekly basis, agents ( $\geq 12$  years old) hold a CRED interaction with a randomly selected agent from each of its three different social networks: family (mother and father), Worldview club (if affiliated), and neighborhood. In club interactions, agents have a higher likelihood of interacting with the leader of the club. During the interactions, the exemplar agent displays a CRED to the observer agent. The effect of CREDs on the observer depends on a value derived from a composite equation with three main factors: display importance, display impact, and display consistency. Importance depends on whether the exemplar is the leader of a club and whether the exemplar belongs to the same club as the observer. Impact depends on the exemplar's *charisma*, the observer's *susceptibility* and *age*, and the age difference between exemplar and observer. Consistency depends on the exemplar's *conscientiousness* and *frustration*, and on whether the exemplar's *worldview* and club affiliation match. The effect of CREDs on the observer may be positive, negative, or neutral, with corresponding changes in *worldview* value and the tendency to affiliate or disaffiliate from a given club. The model runs for several generations during which we monitored the levels of religiosity and secularization in the society.

### 3 RESULTS AND DISCUSSION

We will present preliminary results of simulation experiments on the model, focusing on the initial conditions necessary to drive societies into secular majorities similar to those observed in Scandinavian countries such as Norway. Our ultimate aim is to leverage CRED theory to generate robust new insights into the processes driving secularization of western societies.

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