# 9

# IN GENES WE TRUST

## On the consequences of genetic essentialism

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At the age of 31 years, Csanád Szegedi, a member of the European Parliament, converted to Orthodox Judaism (Puhl, 2014). What makes his transformation noteworthy is that he was elected as a member of the Jobbik party, an extremist anti-Semitic party (Gorondi, 2014). Why would Szegedi undergo such a radical transformation? The key fact in this case is this: Szegedi had recently learned that his maternal grandmother was Jewish (Gorondi, 2014). Szegedi wasn't so bothered that she had been raised Jewish – indeed, when he first learned of his grandmother's past, he thought she had been raised by Jewish stepparents. As he said, "I calmed down, because it's only the stepparents – they are not blood relations of mine" (Applebaum, 2013). But later, he learned that his maternal grandmother's biological parents were also Jewish, and thus Szegedi was Jewish by descent. This story highlights how discoveries about one's own biological ancestry can have profound personal implications.

Szegedi's story may be extreme, but the notion that people look to their genetic ancestors to understand themselves is commonly found. In recent years, it has become possible to learn about the likely geographic origins of one's ancestors through consumer genomics companies. One investigation of the reactions that people had to surprising information that they learned from these tests revealed that some people came to choose different ethnic identities when completing a census, joined new communities, cheered for different sports teams, and took up learning new languages (see Roth & Lyon, 2016). This suggests that people turn to genes as a means to understand themselves on a deeper level. The question that arises, then, is how does the pervasiveness of genetic information affect our psychology? This question has become more important in light of the rapid increase in genetics research over the last few decades, which is often covered extensively in the media (e.g. Heine, Dar-Nimrod, Cheung, & Proulx, 2017).

## Psychological essentialism

Why did Szegedi change his identity when he learned about the origin of his genes? Or, more broadly speaking, why do people seem to view genes as holding the key to understanding themselves on a deeper level? To answer these questions, we need to take one step back and consider psychological essentialism. Psychological essentialism is the tendency for people to believe that natural kinds are as they are because of an underlying hidden essence (e.g. Gelman, 2003). For example, when people consider what is a bird, they tend not to conceive of its identity as being determined by its visible surface features; rather they imagine an internal force that makes it so. Even if a bird were to lose all of its feathers or was no longer able to fly, we would still think of it as a bird – its identity lies somewhere deep beneath all that we can see. Essentialism in a metaphysical sense is philosophically problematic (Medin & Ortony, 1989); however, psychological essentialism doesn't speak to whether essentialist thinking is the "right" way to view the world. It merely describes a deeply engrained psychological tendency to categorize certain entities. Psychological essentialism is a widespread tendency that has been identified in a highly diverse range of different cultures (Henrich, Heine, & Norenzayan, 2010).

Importantly, essences are presumed to have specific characteristics. Essences are thought to be the ultimate cause for a specific outcome (Keil, 1989; Rips, 1989). That is, the cat has a cat essence and it is this essence that makes the cat a cat. Essences are also thought to be stable over time (Keil, 1989; Rips, 1989). So, a cat will always remain a cat, and won't somehow turn into a dog, and the reason for this stability is its essence. Essences are also thought to be immutable. This means that they, and the characteristics they underlie, cannot change, even if superficial characteristics are altered. Essences are not only believed to underlie different species of animals but are also seen to underlie human groups (Rothbart & Taylor, 1992); they make the natural world seem as though it consists of homogeneous and discrete categories. Hence, when people view social groups as sharing an essence, they engage in more stereotypical thinking about those groups (e.g. Haslam, Bastian, Bain, & Kashima, 2006). Last, essences are natural kinds and so the outcomes they cause are perceived as natural (Dar-Nimrod & Heine, 2011). In sum, essences are viewed as being the ultimate cause for a specific outcome, are stable over time and immutable, are natural, and they carve the natural world into homogeneous and discrete categories.

But what exactly makes up an essence? People have a difficult time forming concrete mental representations of what essences actually are, so they instead turn to an essence placeholder to make the essence appear more concrete (Medin & Ortony, 1989). There are many kinds of placeholders that have been used throughout history. For example, in the Judeo-Christian religions, the soul is typically thought of as the locus of the essence, whereas a person's blood type – which is thought to influence personality traits according to Japanese folk psychology beliefs – represents an essence placeholder in Japan (Heine, 2017). However, the layperson's typical understanding of genes makes for a particularly apt essence placeholder.

## Genetic essentialism

People's lay conception of genes overlaps a great deal with how they think of essences (Dar-Nimrod & Heine, 2011). That is, genes are understood as ultimate causes, immutable, homogeneous, discrete, and natural. Therefore, when people consider how genes might be relevant to a given trait or outcome, they come to think of these outcomes in more essentialist terms, which is called "genetic essentialism" (Dar Nimrod & Heine, 2011). Specifically, the outcome that is influenced by genes tends to be viewed as *determined* and *immutable*. For example, if someone believes that they have "the alcoholism gene," they will likely see themselves as destined to become an alcoholic. Furthermore, the gene for a specific outcome is seen as having a specific etiology (Meehl, 1977) and is seen as the *ultimate cause*. In the face of this, other potentially contributing factors such as the environment are discounted. The imagined gene can be seen as a diagnosis for the associated outcome. Hence, if someone finds out they don't have "the alcoholism gene," they may conclude that they can safely drink as much alcohol as they like. A third perception is that groups who share genes are considered as *homogeneous* (all members that share the same genes would share the same phenotypes) and *discrete* from other groups (who have different genes). Last, a genetic foundation for a certain outcome may be viewed as *natural*. This can lead to the naturalistic fallacy: the tendency to consider as morally good what is perceived to be natural (Frankena, 1939). In sum, because genes serve as a placeholder for essences, when people learn about relevant genes they start to think about essences (Heine, Dar-Nimrod, Cheung, & Proulx, 2017).

We call genetic essentialism a biased way of thinking and hence, we might question whether such thinking is actually rational. On one hand, there are some conditions, almost all of them are rare genetic diseases, in which a single genetic cause is deterministic, such as Huntington's disease. In these cases, there is a specific etiology for the disease, it is immutable and the outcome is determined, it makes people with the disease homogeneous and different from those without disease, and it is natural. These kinds of conditions can be largely understood in ways similar to essences.

However, the ways that genes influence phenotypes exist on a continuum. Direct and deterministic relations between genes and phenotypes anchor one end of the continuum, but these represent the exception and not the rule. The vast majority of diseases, traits, and psychological characteristics are the result of far more complex processes (Chabris, Lee, Cesarini, Benjamin, & Laibson, 2015). Typically, many genes are involved (sometimes hundreds or thousands), the genes interact with each other, their expression is governed by experiences, and epigenetic markers further influence their expression (Jablonka & Lamb, 2006). The relation between genes and phenotypes in these conditions is not at all direct or deterministic, and essentialist thinking about these cases is simply incorrect.

The first law of behavioral genetics states that (almost) all human conditions are heritable (Turkheimer, 2000), which means that genes are almost always

relevant, even if only rarely in a deterministic way. At the same time, much research has revealed that the public's understanding of basic genetic science is limited (Condit, 2010). For example, one survey found that 76% of American adults wrongly believed that single genes are responsible for specific human behaviors (Christensen, Jayaratne, Roberts, Kardia, & Petty, 2010). However, this limited genetic literacy does not stop people from frequently talking about genes, such as when Donald Trump attributes his success to having "a certain gene[1]." When people are thinking about genes, they are often thinking about essences, and this can lead to faulty conclusions.

In the rest of this chapter, we will give a brief overview on how genetic essentialism influences people's perception of gender, race, sexual orientation, criminality, health, and obesity, and their implications. Finally, we will consider ways to reduce genetic essentialism.

## Gender

The sex of a person is ultimately determined by their chromosomes. Gender, on the other hand, is partially socially constructed and encompasses both biological and social aspects, such as sex organs and social roles, respectively (Dar-Nimrod & Heine, 2011). Gender is viewed as an essence more than any other social category (e.g. Gelman & Taylor, 2000; Haslam, Rothschild, & Ernst, 2000). When gender is essentialized, people view the genders as more homogeneous and discrete from one another (Dar-Nimrod & Heine, 2011), perceive more sex differences (Keller, 2005), and view men and women as having more gender-stereotypical traits (Brescoll & LaFrance, 2004).

What happens if people are led to view gender differences to be the result of genes? Consider the case of gender differences in math performance (e.g. Miller & Halpern, 2014). In one set of studies, Dar-Nimrod and Heine (2006) assigned female study participants to read a fictitious news article that either claimed that men outperform women on math tests because of their genes or because of their early childhood experiences. Then, the participants completed a math test and their performance was compared with those assigned to control conditions. Those women who read about math genes showed evidence for stereotype threat, replicating past research (Spencer, Steele, & Quinn, 1999). In contrast, those who learned about environmental causes for sex differences in math showed no evidence for stereotype threat. This difference is especially noteworthy as both the gene and experience articles described the gender difference in math to be the identical magnitude (i.e. 5%, another fictitious claim). These findings suggest that if an environmental explanation (such as different experiences between men and women in this study) is made salient, people will hold less essentialist views of gender.

In sum, people tend to view gender in essentialized ways. When people conceive of gender as the product of genes, they tend to view gender differences as being caused by the underlying genes, as immutable, as creating homogeneous

groups, and as natural. While there are mean differences between men and women in many traits and characteristics, most traits and characteristics are normally distributed, and the distributions of men and women largely overlap (e.g. height). But when gender is essentialized, people perceive these differences to be more problematic.

## Race and ethnicity

Race and ethnicity are key social categories that people use for understanding others. While race and ethnicity may be meaningful categories, the question whether they have any biological basis is still debated. By and large, a majority of social scientists and biologists view race as socially constructed, rather than biologically based, as the genetic variability that lies between the continental races (4.3%) is a small fraction of the total genetic variability between individuals (e.g. Rosenberg et al., 2002; Templeton, 2013). Nonetheless, many people view different racial groups as biologically different (e.g. Gil-White, 2001; Wade, 2014).

When people think of race as the product of different genes, they are more likely to engage in stereotypical thinking and prejudice (e.g. Keller, 2005). For example, Jayaratne and colleagues (2006, 2009) found that people, who attributed racial differences in intelligence, aspirations, and violence more to genetic causes, were also higher in their endorsement of racist attitudes. Likewise, when Jewish and Arab participants in the United States learned that Jews and Arabs were genetically distinct, they were more willing to use physical aggression against an outgroup target than when they learned they were genetically similar (Kimel, Huesmann, Kunst, & Halperin, 2016). Moreover, people are more willing to view ethnic stereotypes to be a product of genetic differences when they learn that gene frequencies are distributed unevenly around the world compared with those who learned about the relative homogeneity of the human genome (Schmalor, Cheung, & Heine, 2017). These examples show that thinking about a genetic foundation of race leads people to an altered perception of reality. Different ethnic groups are viewed as homogeneous and discrete, and as having characteristics and traits that are immutable and as natural.

## Sexual orientation

People's attitudes toward the acceptability of homosexuality vary tremendously. Curiously, a key variable that predicts one's attitudes toward homosexuality is what one perceives as its cause. Much research finds that people who view genes as underlying differences in sexual orientation tend to have more pro-gay attitudes than those who don't view genes as being involved (e.g. Hegarty & Pratto, 2001; Jayaratne et al., 2006). Given that these data are correlational, there are multiple interpretations of this relation. For example, it's possible that people turn to genetic accounts of sexual orientation to rationalize their support for gay rights. However, there have also been experiments that test how people react

when they learn of a genetic cause for sexual orientation. These studies have found that people who read about genetic causes of sexual orientation report more support for gay rights than those who read about environmental causes (e.g. Frias-Navarro, Monterde-i-Bort, Pascual-Soler, & Badenes-Ribera, 2015). Perhaps the rapidly increasing support for gay rights is the product of the corresponding increase in people's beliefs that sexual orientation is innate (Heine, 2017). Interestingly, whereas perceived genetic causes of gender differences and ethnic differences are associated with less tolerance to those of different sexes and races, perceived genetic causes of sexual orientation have the opposite effect. Social conservatives often criticize gay men and lesbians because they perceive their sexual orientation to be "unnatural." Considering the role of genes in sexual orientation leads people to assume that an underlying gay essence renders different sexual orientation as natural, and therefore more acceptable (Dar-Nimrod & Heine, 2011). People's reactions to arguments about genetic bases of sexual orientation represent an interesting case, as the evidence regarding actual causes of sexual orientation continues to be debated. Sexual orientation is heritable (Bailey & Pillard, 1995), but the meaning of this is unclear as the first law of behavioral genetics reminds us that (almost) all human behavioral traits are heritable (Turkheimer, 2000). As of yet, there have been no single genes identified that predict sexual orientation although there is debate about the relevance of a region on the X chromosome for male sexual orientation (e.g. Sanders et al., 2015). The most direct evidence for a biological basis of homosexuality is an immune system response from mothers in which they produce anti-male antibodies in response to the male-specific antigens that are created by male fetuses. With each subsequent son, the number of these antibodies increases, and this has the effect of increasing the likelihood that the younger sons will become gay (Bogaert & Skorska, 2011).

## Criminality

What causes the behavior of criminals? This is a key legal question, as perceptions of guilt hinge importantly on the concept of *mens rea*, which translates into a "guilty mind." However, much research reveals that discussions of the role of genes in criminal behavior can have a significant impact on the ways that people think about guilt and responsibility, even among legal professionals (Aspinwall, Brown, & Tabery, 2012; Berryessa, 2016).

Although thus far there have been no common genetic variants that have been found to have a large impact on the likelihood of criminal behavior (see Heine, 2017 for a review), people are influenced by the mere discussion of such kinds of genetic influences. For example, Cheung and Heine (2015) found that when people learned of a genetic predictor of violent behavior, they were more likely to endorse a diminished capacity defense compared with those who learned of an experiential cause of violence (also see Monterosso, Royzman, & Schwartz, 2005). Moreover, genetic causes, as opposed to experiential causes, are associated

with a perception that the perpetrators have less control over their behavior (Dar-Nimrod, Heine, Cheung, & Schaller, 2011). On the other hand, genetic causes are thought to be associated with increased recidivism among convicted criminals (Cheung & Heine, 2015). The believed cause of criminal behavior can affect legal decision making. This shows that perception of reality (whether criminality is caused by genes) can have significant consequences.

## Health

A key impetus of the genomics revolution is to study the ways that genes impact our health. However, much research points to an unintended consequence of this endeavor: Learning about genetic causes to health can change the very ways that we think about illness and health.

The ways that genetic attributions for health affect people's perceptions are most clearly evident in discussions of mental illness. On the one hand, genetic attributions for mental illness tend to be associated with increased sympathy and tolerance to those afflicted. The afflicted is viewed as having less control over their disease, and therefore is viewed as less blameworthy (e.g. Kvaale, Gottdiener, & Haslam, 2013). But the double-edged sword of genetic essentialism cuts both ways, and genetic attributions for mental illness can make people more pessimistic about one's prognosis (Phelan, Cruz–Rojas, & Reiff, 2002; Schnittker, 2008). Indeed, if the cause of the illness is perceived to lie in one's genes, and because one's genes aren't going to change, people are more likely to view the condition as chronic. Moreover, genetic attributions for mental illness can sharpen the line that distinguishes between the afflicted and the healthy, and it can thus further stigmatize those with the condition (Mehta & Farina, 1997). For example, research in schizophrenia finds that when people learn of genetic accounts of schizophrenia, they view people with the condition to be more dangerous (e.g. Kvaale et al., 2013). Furthermore, when people learn that a condition has a genetic basis, they are more likely to view a biologically grounded treatment, such as medications rather than psychotherapy, as the most effective way to treat the condition (Lebowitz & Ahn, 2014; Phelan, Yang, & Cruz-Rojas, 2006). In sum, the very way we conceive of mental illness, and the expectations that we have for those afflicted by them, hinges on whether we believe that genes are involved.

## Obesity

Obesity is a highly moralized topic, and people are often prejudiced against obese people and blame them for their weight. However, when genes are brought into the discussion, obesity comes to be seen as more immutable and beyond one's control. For example, research finds that people are less likely to blame someone for overeating when a genetic cause, as compared to an environmental cause, was provided (Crandall, 1994; Monterosso et al., 2005). On the other hand, environmental explanations, such as the influence of friends and changing social norms,

do not tend to reduce blame. Of course, a purely genetic account of obesity makes little sense considering that obesity rates have risen across the world in the past few decades (Organization for Economic Co-operation and Development, 2004).

However, believing that obesity is caused by genes can have other implications. Dar-Nimrod, Cheung, Ruby, and Heine (2014) exposed participants to information that either stated that (1) genes are a cause of obesity; (2) one's social networks are a cause of obesity; or (3) they read no information about obesity. Afterwards, participants were invited to evaluate the taste of some cookies. Those who had learned about a genetic cause to obesity ate more cookies than participants in the other two conditions. This suggests that people come to think of their own weight in more fatalistic terms, and, ironically, this belief itself may lead people to engage in behaviors that will increase their likelihood of becoming overweight. What people take to perceive as the reality of obesity can thus directly affect their health outcomes.

## Eugenics

Arguably, the most problematic consequence of genetic essentialism is support for eugenics. When genes are perceived to be the ultimate cause of a certain outcome, then it follows that efforts to try to change that outcome should target the underlying genes. Eugenic ideas have been around at least as long as Plato; however, they achieved their high water mark in the early 20th century. During this time, eugenic ideas held popular support across the industrialized world; however, eugenics curried particular favor among geneticists. In the early 20th century, there was much overlap between genetics and eugenics to the point that the latter was often thought of as applied genetics (Paul, 1995). The links between the two fields were evident in 1916, when every member of the founding editorial board of the journal, *Genetics*, endorsed the eugenics movement (Ludmerer, 1972). Moreover, it was stated that half of academic biologists in Germany joined the Nazi party prior to the war, which was the largest representation of any professional group (Paul, 1995).

A key reason that the study of genetics and eugenics overlapped so much in the early 20th century was because many early geneticists favored simple Mendelian accounts of human traits, where each trait was seen to be matched with a corresponding gene (Heine, 2017). For example, the leading American eugenicist, Charles B. Davenport, argued that such human traits as feeble-mindedness, a love for the sea, nomadism, shiftlessness, and innate eroticism, were the product of single genes (Comfort, 2012; Kevles, 1985). If single genes really were the direct cause of human traits, then it would indeed be more straightforward to imagine efforts to change the future of humankind through controlled breeding. However, there are no single genes that can account for a large proportion of the variance for any human psychological traits. Rather, as the so-called "fourth law of behavioral genetics" puts it, human traits are the product of many genes that each contribute a very small amount (Chabris et al., 2015).

We investigated whether there was a relation between endorsing genetic essentialist views and support for eugenics policies. Indeed, the more that people believed genetic essentialist views, the more likely they were to endorse government policies to control breeding (Cheung, Schmalor, Ream, & Heine, 2017). The field of eugenics demonstrates that even the most horrific behaviors can be viewed as more or less justified based on what reality is believed to be.

## Public communication

It is perhaps not surprising that genetically essentialist views are commonplace, when we consider that the media frequently oversimplifies genetics findings. For example, Conrad (2002) criticized the media for often describing genetics research using a one gene, one disease (OGOD) framework. Moreover, as in the rest of scientific research, studies that yield positive findings tend to get more media coverage than subsequent research that fails to replicate those findings. And failed replications are particularly common in genetics research (Faraone et al., 2008), likely because the effect sizes of particular genetic variants are extremely small.

But the media is not solely responsible for the oversimplification of genetics findings. Scientists compete for funding and media attention, and often make broader generalizations than are warranted. One study investigated the original articles from scientists and their respective media coverage and found that only a small proportion had been grossly exaggerated by the media outlets (Bubela & Caulfield, 2004). While scientists of all disciplines sometimes overclaim, the consequences may be more severe when genetics researchers do so, given people's essentialist tendencies (Dar-Nimrod & Heine, 2011).

## Reducing genetic essentialism

We have argued that genetic essentialism is a biased way of thinking that often yields negative consequences. This raises an important question: Can genetic essentialism be reduced? Are there ways of presenting genetics information that won't lead people to become overly fatalistic?

It would seem that a first problem with essentialism is that people have overly simplistic notions about genetic causes. Perhaps this comes from a high school curriculum where genes are frequently described in Mendelian terms, with each gene being matched with a corresponding phenotype. These simplistic causal stories lend themselves well for the deterministic thinking associated with essentialism. But, as noted above, this kind of genetic cause is the exception, not the rule, and there are very few human traits that are Mendelian (Jablonka & Lamb, 2006). For example, there is only one Mendelian trait (whether your earwax is wet or dry) out of the 60+ traits covered by the largest consumer genomics company, 23andme (Heine, 2017). For the most part, identified Mendelian traits in humans are limited to rare genetic diseases. The vast majority of human traits are the product of many genes interacting with themselves, an individual's

experiences over a developmental trajectory, and whose expressions are further influenced by epigenetic markers (Chabris et al., 2015). This suggests that a more realistic understanding of genetics, in all its intricate richness, should be less associated with essentialist thinking.

There is evidence that more complex genetic causal accounts are associated with less essentialist thinking. For example, we provided participants with a vignette that described the violent behavior of a suspect, as well as some supposed research that investigated the etiology of violent behavior – these etiologies varied by condition, and were entirely fictitious (Cheung et al., 2017). Participants were then asked to evaluate the appropriateness of a diminished capacity defense. Replicating past research (Cheung & Heine, 2015), those who read about a simple genetic cause felt the diminished capacity defense was far more appropriate than those who read about no causes, or about the environmental cause. On the other hand, those who read more complex accounts of how genes relate to phenotypes were less likely to use the diminished capacity defense. This suggests that learning about the vast complexity of genotype–phenotype relationships may help reduce genetic essentialism.

Further evidence that essentialism is reduced by complex causal accounts can be seen in terms of the impact of genetics education on essentialism. Research finds that people who have taken more genetic courses (or who answer more items correct on a test of genetic knowledge) tend to show weaker genetic essentialism (Cheung et al., 2017). One international comparison of primary and secondary school teachers revealed that more biological training was associated with less of a tendency to appeal to innate and essentialist understandings of group differences (Castéra & Clément, 2014). In particular, research has found that genetics education that focuses on the interactive role of genes and experiences leads to a less deterministic understanding of genetic causes in comparison to a traditional Mendelian curriculum (Radick, 2016). These findings highlight that the more that people understand how genes actually operate, in all their intricate richness, the less likely they are to be vulnerable to essentialism.

## Conclusion

People want to understand the social worlds they live in. One way to make sense of human behavior and diverse ethnic groups is to invoke genetic explanations. While research consistently shows that individual genes rarely predict human traits (Chabris et al., 2015), lay people often think in terms of genes as determining life outcomes. Sometimes, essentialist thinking is associated with increased tolerance for others, as found in research on attitudes toward homosexuality, criminal behavior, and mental illness, whereas in other domains essentialist thinking can be associated with increased racism, sexism, and support for eugenics. Given that genes are involved in virtually all human traits (Turkheimer, 2000), it is important to understand when and how encounters with genetic ideas will lead to essentialist thinking.

Most research on genetic essentialism has been conducted in Western industrialized societies and it remains to be seen to what extent other cultures tend to think in genetic essentialist ways (Dar-Nimrod & Heine, 2011). Although psychological essentialism occurs in many different cultures (e.g. Gil-White, 2001), some studies suggest that other cultures may show genetic essentialism to a lesser degree. For example, East Asians are more likely than Westerners to consider the situational context in evaluating the behavior of others (e.g. Choi, Nisbett, & Norenzayan, 1999), and tend to have more incremental views of self (Heine et al., 2001). One study found that when Chinese made predictions about the future of a person, they were less likely to consider biological information than Canadians were (Lee, 2009). In addition, people of lower socioeconomic status are less likely to make dispositional attributions in comparison with those of higher status (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Kelter, 2012). Research on genetic essentialism in other cultural groups would certainly be informative.

Genetics research is undoubtedly important. It may help cure diseases, aid in the production of safe food, and increase the quality of life in a variety of ways. On the other hand, an oversimplified picture of how genes work not only leads to genetic essentialism with all its negative consequences but it may also reduce the political desire to change environmental factors in the pursuit of political goals. For example, if people believe that school performance is determined by one's genetic endowment, then they will not see the benefit of allocating funds toward improving the school performance of disadvantaged groups. Likewise, overly focusing on genetic causes may redirect research funding away from studying the key role that people's experiences can have on life outcomes. It is important to attend to all of the kinds of influences on our lives.

## Note

1 Quote from CNN interview, February 11, 2010. Retrieved on May 31, 2017 from http://www.cnn.com/2010/SHOWBIZ/02/11/donald.trump.marriage.apprentice/

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