A Rhetorical Analysis of *Population tipping point could arrive by 2030* by Tyler Santora

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Background Of Analysis

The article being analyzed is a short report on recent information regarding a global population crisis from IHME reports, and the discussion of conflicting opinions and data. The article starts by reporting on the recent IHME analysis that experts claim points to the possible effects of population decline taking effect as soon as 2030. The article moves from this information into discussing what an inability to meet replacement rates actually means for the human population. The later half of the article delves into competing information on the topic, using expert testimony to show the difference in consensus on the issue. The article ends with a conclusion of its main points and leaves the discussion with some uncertainty as to how the population of our species will actually unfold in the near future.

Intended Audience

In order to assess the framing the author is making around this text, it is important to identify the target audience. Being published on *Science.org*, it is safe to assume that the target audience is the frequent and prospective visitors of the site. This audience is interested in science news, but may not necessarily be a part of the scientific community themselves. *Science* aims its content at younger members of the public — ages 25-34 — that have interest in, and place value upon scientific research. This value of science often correlates with the current pursuit, or having achieved a college degree (SimilarWeb). This also leaves their articles to somewhat fall into the trend of sensationalized media in the interest of drawing in a larger audience. Since *Science* does allow a limited number of free articles per individual, it can be safely assumed that drawing in more of a general public audience is a part of their rhetorical goals. Accurate reporting of scientific information is also a cornerstone of their overall purpose, which does limit the extent to which articles can be sensationalized.

Although the article does not make any direct callout to a specific audience, it alludes to an intended audience of those within an age range expected to be concerned with the decision of having kids. Since this group is the most influential, and the most influenced by the issue at hand, it seems only logical that this article would be aimed at them. This demographic also overlaps with the identified target demographic of *Science*, supporting the assumption that this is indeed the intended audience.

Emergent frame

The rhetorical strategies used within this article work to support a frame of impending crisis, uncertainty, and fear. Santora uses the ethos of expert testimony to support their credibility, in combination with an emotional appeal supported by connotative language, and the utilization of hedging and model uncertainty to create an effective argument for increased concern over the uncertainty associated with population decline.

Rhetorical strategies

Santora uses three primary rhetorical strategies to support a frame of impending danger. First I will look at how Santora uses quality experts in the field of demography to establish both the credibility of the information being presented, and Santora's credibility as a journalist. I will then delve into how Santora's use of connotative language creates an emotional appeal to the audience's fears. I will finish the analysis by describing how Santora takes advantage of the hedging of their sources and model uncertainty to direct the audience's uncertainty on the topic in a desired direction. I will also cover how the included data visualization is used to support these rhetorical strategies as well.

Appeal To Ethos

A major part of Santora's rhetorical strategy is how they establish credibility. This credibility is formed in an interesting way. Santora himself has no connection to the topic of the article with which to establish a credibility of expertise. According to his Linkedin, Santora is a freelance science and health journalist (Linkedin). This means that the quality of an appeal to ethos has to rely on the quality or reputation of reporting on Santora's part. While Santora has other articles published, this is his first publication in *Science*. To the audience, Santora appears as a first time author, making the quality of the reporting done within the article the only tool for Santora to establish credibility. The trust returning members have in the vetting for quality done by *Science* as a publication source does also influence the audience's assumption of credibility to some degree.

To actually establish credibility within the article itself, Santora focuses on using expert testimonials and other credible sources of information on the topic. The expertise of the individuals interviewed within the article lends credibility to the information being presented, and the number of outside sources included in the article acts to foster Santora's credibility as an effective journalist.

It is very interesting that Santora gives almost no statements of opinion himself, hiding the purpose of his article behind the quotes of the various experts they interviewed. Early in the paper, a quote from the co author of the original study — Christopher Murray — is used to call into question the accuracy of the 2030 forecast, implying that we could see an impact earlier.

Later in the article, input on the differing outcomes between demographic predictions are taken from the chief of the Population Estimates and Projection Section of the U.N. Population Division, Patrick Gerland. As well as Anne Goujon, a director at the Wittgenstein center for

demography and human capital. It is from these individuals that Santora draws his information on how the statistical measures of different organizations differ from the ones used by IHME, and how predictions differ according to these differing approaches. These experts are also quoted directly at the end of the article to highlight the importance of the issue. Specifically, Alex Ezeh — a global health professor at Drexel University — is quoted to highlight the idea that population decline will widen the gap of socio-economic disparity. A quote from Christopher Murray wraps up the article with an emphasis on this issue needing to be addressed as soon as possible, and not treated as something affecting the future, to be addressed in the future.

This article presents audiences with information from four experts in the field of demography, three of which are high level employees of demography research endeavors from IHME, the U.N. and the Wittgenstein center. Since the audience highly values scientific reporting, these experts make the article's information very credible, also making Santora credible due to the quantity of equally influential voices they were able to pull together.

Appeal to Pathos

Santora's appeal to pathos in this article is an appeal to fear. I must clarify that it is not an appeal to total, paralyzing fear. It is an appeal to anxieties about the future of the human race, for which the base emotion is fear. This emotional appeal is supported primarily through select choices of connotative language Santora uses throughout the article.

Santora's appeal to fear is aimed at supporting concern for the issue of population decline being discussed. This is best evident in how the article starts by giving the audience a specific number of children that all capable individuals must have in order to maintain the replacement rate. The start of the article also highlights the idea that new information places the start of this

crisis much closer than previously expected. This appeal is made to draw in those concerned with declining fertility and birth rates in countries across the globe.

This appeal to pathos is reinforced by the cliffhanger on which the article ends. The article concludes with the sentiment that no matter how statistical measures differ, there is a crisis on the horizon. The importance of immediate action is the final sentiment readers leave with.

The emotional appeals within the paper are facilitated by the use of connotative language in key places. In the first paragraph, the article claims 2.1 children is the number, “everyone able to give birth must have to keep the human population from beginning to fall (Santora, 2024).” In this instance the use of the word *fall* is used to imply drastic and immediate repercussions if we fail to meet the aforementioned number. Within the same paragraph, the date when we will start to experience the effects of not meeting the replacement rate is described as a *tipping point*, further implying the direness of failing to maintain the replacement rate.

A few paragraphs later, Santora highlights the quote from Christopher Murray, describing Murray's uncertainty as speculation that their predicted date of 2030 is a conservative estimate. The use of the word *conservative* is used to both highlight the uncertainty of the IHME prediction and to again imply impending concerns.

Language with these negative connotations are present throughout the paper. They are effective at highlighting a sense of concern that should be taken from the data and testimony of experts. This is primarily how the article builds its rhetorical frame. Taking advantage of its young target audience's likelihood to feel anxiety toward the possible instability of their future. A strategy shared with issues of climate change and economic stability.

Model Uncertainty

The third rhetorical strategy which Santora employs makes up the majority of the article's design. This strategy is weaponizing model uncertainty and hedging. In the case of this article, Santora does not engage in any hedging themself. Rather, they take the gap in certainty provided by professionals in the field to form an epideictic version of the scientific message. As was concluded in a paper on the dangers of hedging, "what is cited or credited to a particular article occasionally may differ significantly from what is explicitly printed. Various parties—including the media, concerned scientists, and parents—reference… [articles]... for an idea not clearly stated (Kolodziejski, 2014)." This is the fundamental basis for the overarching frame, taking the reasonable uncertainty of analysis based on different statistical approaches to the same problem and implying more finality in the claims of experts.

One of the major goals of using so many dissenting sources of information is to highlight the model uncertainty present within the larger discussion of demography. According to a study on the effect of model uncertainty on opinion and policy regarding COVID-19, "...uncertainty can be manipulated and weaponized because it offers ways to sow doubt…," by accentuating uncertainty for the pursuit of particular agendas (Kreps & Kriner, 2020). In the case of this article, there is no agenda outside of influencing the audience's opinions. Santora points out model uncertainty not to sow doubt in the science, they want the audience to trust that the science is right about the population crisis. The goal of highlighting model uncertainty is to support the idea that *when* the crisis will hit is unknown. This works to support the uncertain forecasting which is the goal of the article's frame.

This strategy also works to support the emotional appeal through the highlighted uncertainty, and takes advantage of the credibility it established through the experts whose

hedging has now been used against them. This strategy primes the audience to follow along with the article's frame due to the great certainty behind the dire effects of population decline mixed with the uncertainty as to when the effects are expected to take place.

Use of images

It is also important to consider the influence of the image included alongside the article has on its rhetorical strategies. This image is a graph taken directly from the original IHME report. It shows population decline starting in 1950 and mapping to 2100, 2022 and 2030 are marked near the middle (Appendix B).

This image is not designed to support this article's frame, but has flaws that were aptly taken advantage of to support Santora's frame. The image reaches too far into the future, implying that population will continue to decline at a similar rate past 2030. This is a statistically accurate, but unrealistic representation. The graph only maps current population decline rates, it does not take into account a potential increase in replacement rate occurring in future cohorts of the population. As this is not explained, the image works well to support an idea that failing to meet the 2.1 requirement to maintain the current replacement rate will have long lasting and permanent effects on population growth.

Conclusion

In this paper I have identified the major rhetorical strategies utilized by the author to influence the intended audience towards a frame of uncertainty and fear. Regardless of whether or not the frame identified within this article is intentional, there is enough evidence within the text to show the prevalence of specific rhetorical strategies. These strategies support each other and effectively lead readers towards certain takeaways.

Overall this article uses rhetorical strategies to influence the perceived importance and threat of future population decline, without outright stating its importance and reasoning why the audience should increase their concern in the matter.

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Appendix A

Population tipping point could arrive by 2030 by Tyler Santora

Two point one: That's how many children everyone able to give birth must have to keep the human population from beginning to fall. Demographers have long expected the world will dip below this magic number—known as the replacement level—in the coming decades. A new study published last month in The Lancet, however, puts the tipping point startlingly near: as soon as 2030.

It's no surprise that fertility is dropping in many countries, which demographers attribute to factors such as higher education levels among people who give birth, rising incomes, and expanded access to contraceptives. The United States is at 1.6 instead of the requisite 2.1, for example, and China and Taiwan are hovering at about 1.2 and one, respectively. But other predictions have estimated more time before the human population reaches the critical juncture. The United Nations Population Division, in a 2022 report, put this tipping point at 2056, and earlier this year, the Wittgenstein Centre for Demography and Global Human Capital, a multidisciplinary research organization dedicated to studying population dynamics, forecasted 2040.

Christopher Murray, co-author of the new study and director of the University of Washington's Institute for health Metrics and Evaluation (IHME), suspects his study's forecast is conservative. "With each passing year … it's becoming clearer that fertility is dropping faster than we expect,"they says. Because the 2030 figure is already a hastening of IHME's previous estimate of 2034, "I would not be surprised at all if things unfold at an even faster rate," he says.

A drop below replacement fertility does not mean global population will immediately fall. It will likely take about 30 additional years, or roughly how long it takes for a new

generation to start to reproduce, for the global death rate to exceed the birth rate. Even then, because countries' fertility may vary dramatically, global fertility rate is a "very abstract concept that doesn't mean much," says Patrick Gerland, chief of the Population Estimates and Projection Section of the U.N. Population Division. Butthey says the trend points to a world increasingly split between low-fertility countries, in which a diminishing number of young people support a burgeoning population of seniors; and high-fertility countries, largely poorer sub-Saharan African nations, where continued population growth could hamper development.

Estimating when the world will reach the turning point is challenging. The new model from IHME is based on how many children each population "cohort"—people born in a specific year—will give birth to over their lifetime. It captures changes such as a move to childbirth later in life. But full cohort fertility data are thus far only available for generations of people older than 50, and so the IHME model builds projections within itself to try to capture trends as they are unfolding.

In contrast, the U.N. and Wittgenstein models are based on each country's total fertility rate, or the sum of age-specific fertility rates, typically for those between the ages of 15 and 49, which is considered reproductive age. As a result, temporary fluctuations in childbearing behaviors—say, people decades ago delaying giving birth to children so they could advance in their education and careers—can throw off their projections, and they can miss longer term changes in childbearing behaviors. These models may have been prone to undercounting fertility in the past, then finding a temporary rebound in fertility rate, and therefore predicting a longer time frame for world population decline.

This is one reason that Wittgenstein is considering moving to a cohort model, says Anne Goujon, director of the Population and Just Societies Program at the International Institute for Applied Systems Analysis, one of the three institutions that form the Wittgenstein Centre.

Other factors also contribute to the differences between the projections, including how the IHME model accounts for four variables that impact fertility, including access to contraceptives and higher education among those who give birth. (The other two models generally do not, although Wittgenstein considers education.)

Regardless of when the turning point comes, "growing disparity in fertility levels could contribute to widening of [other] disparities," says Alex Ezeh, a global health professor at Drexel University, who was not involved in the Lancet study. For middle- to high-income, low-fertility countries, falling below replacement level could mean labor shortages and pressure ont ealth care systems, nationalized health insurance, and social security programs. Meanwhile, low-income countries that still have high fertility are at heightened risk of falling further behind on the world's economic stage, Ezeh says. "They will not be able to make the necessary investments to improve health, well-being, and education" with too few resources to support a booming population.

Although some experts, including Goujon, think there isn't yet reason for alarm, others call for urgency. "This is going to be a very big challenge for much of the world," Murray says. "There's a tendency to dismiss this as sort of like, yeah, we'll worry about it in the future. But I think it's becoming more of an issue that has to be tackled sooner rather than later."

Appendix B

Data Visualization From IHME Report And Accompanying Text

A steady decline

Global fertility has been dropping for several decades. Low-income countries in sub-Saharan Africa and high-income countries such as the United States and Japan are expected to dip below the level needed to sustain the human population in the coming decades. But a new model says the global fertility rate could drop below the replacement level as soon as 2030.