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## Jews in Time and Space

Using data on the birthdate and birthplace of authors for the books of the Hebrew Bible, the Talmud, and the post-Talmudic rabbinic literature, this study quantitatively tracks Jewish history up to the 20th century revealing a series of pulses of cultural activity that can be represented as S-curves. The development of each of these main sections of the Jewish religious canon is shown to constitute an independent coherent development process. The pattern of successive pulses of books entering the Jewish canon persists over millennia. This shared canon, both stable and growing, allowed coordination between far-flung community networks. The geographic locations of the successive pulses trace the migratory pattern of the Jews over the course of world history spanning much of the globe. Analysis reveals a current 2000-year pulse of Jewish cultural activity with several centuries remaining before it reaches saturation. Modernity becomes evident in Jewish history with sustained pulses of activity in the arts and sciences beginning with the onset of political emancipation in Central and Western Europe and moving on to the United States. The method employed in this study sheds light on the continuous coherent development of a Jewish religious canon and offers new perspective on the historical migration of the Jewish people over the last three millennia.

KEY WORDS: *Jewish history, world history, logistic analysis, religious canon, Hebrew Bible, Talmud.*

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### Introduction

The history of the Jewish people has been a subject of scholarship since ancient times. This study attempts a novel approach to the subject by tracking and analyzing Jewish history quantitatively. It uses a numerical variable, or proxy, that allows measurement and analysis of cultural activity over time. Jews are called the People of the Book for several reasons. One owes to their continuous engagement with codifying knowledge across cultures and centuries, what Albert Einstein called “the pursuit of knowledge for its own sake.” Perhaps even more fundamentally, the “Book” refers to the Hebrew Bible. The authors of the books of the Hebrew Bible, the Talmud, and the subsequent rabbinic literature constitute the proxy variable used for this study. Data on the individuals responsible for additions to the Jewish canon, their birth coordinates in space and time, are analyzed for historical patterns. Beginning in the 19<sup>th</sup> century, this study considers, separately, data on the birth date and location of Jewish Nobel Prize winners.

Collectively this dataset on authors is uniquely valuable in providing a continuous series spanning more than 3000 years. Despite furious debates over the meanings con-

tained in the Hebrew Bible and Talmud, these books, together referred to as the Torah, offer a fair representation of the evolving ethos of the Jewish people. Moreover, the addition of books to the core canon studied by Jewish religious scholars occurred in parallel with the historical travails of the Jewish people. The books included in the dataset were drawn from the Responsa Global Jewish Database, Version 19, compiled by Bar-Ilan University (Bar Ilan Responsa database v. 19, 2011). For details on the criteria for data inclusion, see Appendix 1 – Data Notes. The compiled data are available at [http://phe.rockefeller.edu/docs/JST\\_historical\\_table.xls](http://phe.rockefeller.edu/docs/JST_historical_table.xls).

## Method

An S-curve model was used to analyze the data. This group of mathematical models was developed to describe the growth of biological organisms, for instance tracking the height of an individual sunflower plant, as well as populations of organisms, like the population of bacteria in a petri dish. The models have also been applied to technological development based on the notion that the diffusion of technology resembles a biological growth process. For example, S-curves describe processes like the adoption of industrial methods for manufacturing steel and the number of automobiles per person in a given country (Gruebler, 1996). When used to describe the growth of technological populations, the S-curve actually measures a social phenomenon, the diffusion of social acceptance for a new way of doing things. Ideas diffuse in space as well as time. Hägerstrand (1952) was the first to identify and characterize instances of diffusion waves in transportation and agricultural technologies that radiate over space.

Among the many models used to project the growth of populations, S-curves remain unique in that this group of mathematical functions incorporate negative feedback processes that constrain population growth and eventually cause it to stop altogether. By incorporating this feedback, S-curves better resemble empirical examples in which growth processes experience resistance over time, frequently as a product of their own success. New growth requires new ideas. The typical S-curve follows a trajectory beginning with slow growth (early adoption), followed by rapid growth (diffusion), followed by decelerating and eventually negligible growth (saturation, see Figure 1). In Figure 1, the characteristic duration ( $\Delta t$ ) represents the amount of time elapsed between 10% and 90% of the growth to the saturation value ( $k$ ). The midpoint ( $b$ ) represents the center (inflection) point of the plot, or the time at which the rate of growth peaks and begins to slow (Meyer et al., 1999). The numbers shown in the figure correspond to the growing time and height of a sunflower.

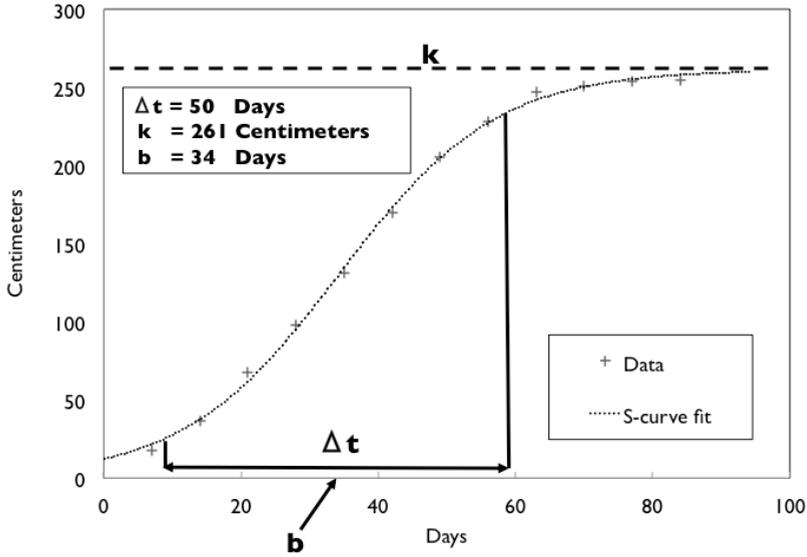


Figure 1. Example of an S-curve. The growth of a sunflower fitted with a single logistic curve. All S-curve fits were generated using Loglet Lab 3.0 Javascript Edition, see <http://lizardinthesun.com/loglet/loglet3.html>. Data from Thornton (1922).

Most generally, S-curve models provide a way to describe the diffusion of ideas and social traits over time, if suitable proxy variables can be found to capture those ideas and traits. Because religion represents a collection of social traits that diffuse over time, this analytic method is suitable for examining its evolution. For example, Marchetti (1994) uses an S-curve analysis to study the dynamics of the Catholic religion over time. This study uses proxy variables, authors of noted Jewish texts and outstanding Jewish scientists, and an S-curve model to divine the patterns of Jewish history.

## Jews in Time

### *The Hebrew Bible*

The Hebrew Bible includes 24 books that were written, edited, and assembled over more than a millennium. Figure 2 shows that the writing of the Hebrew Bible forms a single coherent pulse of activity beginning when Egypt reigned supreme in approximately 1500 BCE (Before the Common Era) and concluding in the centuries that witnessed the division and demise of the Greek Empire and the ascent of Rome as the global power.

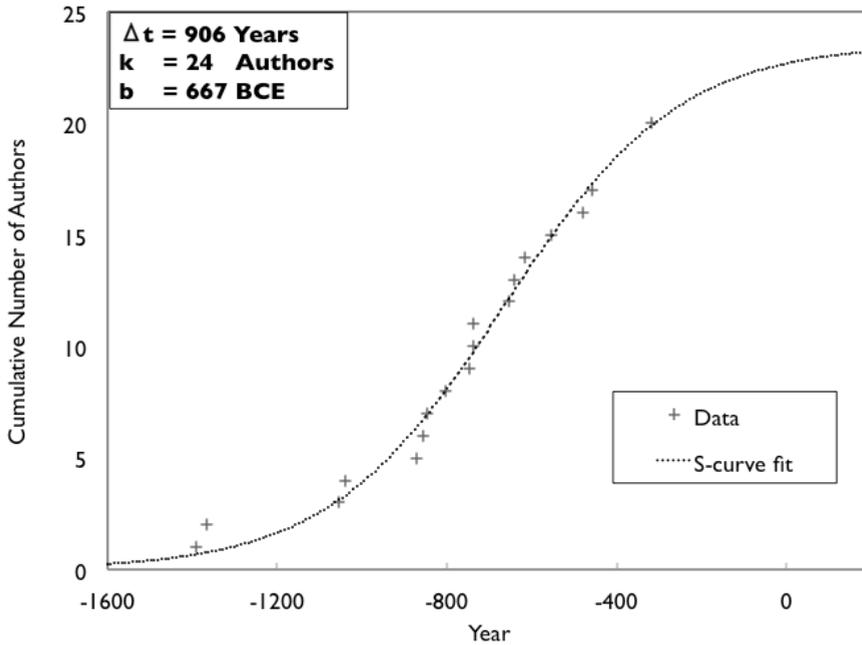


Figure 2. Cumulative number of authors of the Hebrew Bible by author birth year. Data source: Babylonian Talmud<sup>a</sup>. For more information, see Appendix 1 — Data Notes.

The midpoint of the development of the Hebrew Bible occurs in 667 BCE, roughly coinciding with the death of the prophet Isaiah. This date falls almost exactly between invasions of the Levant by the eastern empires, Assyria and Babylonia in 720 and 586 BCE, respectively. These events would permanently upset the stability of a long-standing Jewish presence in the region. The books added to the Hebrew Bible after this period generally offer moral critique as well as predictions of cataclysm and utopia occurring at the end of days.

The Hebrew Bible ends with accounts of how remnants of the Jewish people living in Babylonia (by then a part of the Persian Empire) returned to establish the second Jewish commonwealth on the Mediterranean coast (c. 500-300 BCE). In Figure 2 we see that the process saturates in the centuries following the death of Alexander the Great (326 BCE) and coincides with the ascension of the Essenes, a group considered by many to be the antecedents of Christianity.

The books of the Hebrew Bible sit on more shelves in more homes in the Western world than any other. Both Christianity and Islam recognize the authority of the Hebrew Bible but consider it to be superseded by subsequent historical developments (Halevi, c. 1140). The Hebrew Bible inspired numerous important works of early Renaissance

art and provided the point of departure for defining many of the foundational values of Western civilization. Values like individualism, democracy, and universal justice (Cahill, 1998) found a common recognized source in the Hebrew Bible and endured as the unspoken ideals behind the advance of Western civilization up to the modern period.

***The Mishna/Talmud***

For several hundred years following the canonization of the Hebrew Bible, new works (e.g., The Book of the Maccabees) did not enter the Jewish canon. An entirely new section of the canon was added with the publication of the Mishna around the year 200 CE. The Mishna - roughly translated as the “reviewed material”- is a codification of the oral tradition that had previously relied on direct transmission between student and teacher in the academies. The previous method of transmitting knowledge became too precarious in a world where political stability was the exception rather than the rule. The Babylonian Talmud followed the Mishna in the development of the Jewish canon. The Talmud, codified in the 5<sup>th</sup> to 7<sup>th</sup> century CE, examines centuries of legal discussion aimed at clarifying ambiguities and establishing the framework for inquiry to open new intellectual avenues, all based on the Mishna. Figure 3 shows the cumulative number of the main authors over the course of development of the Mishna/Talmud.

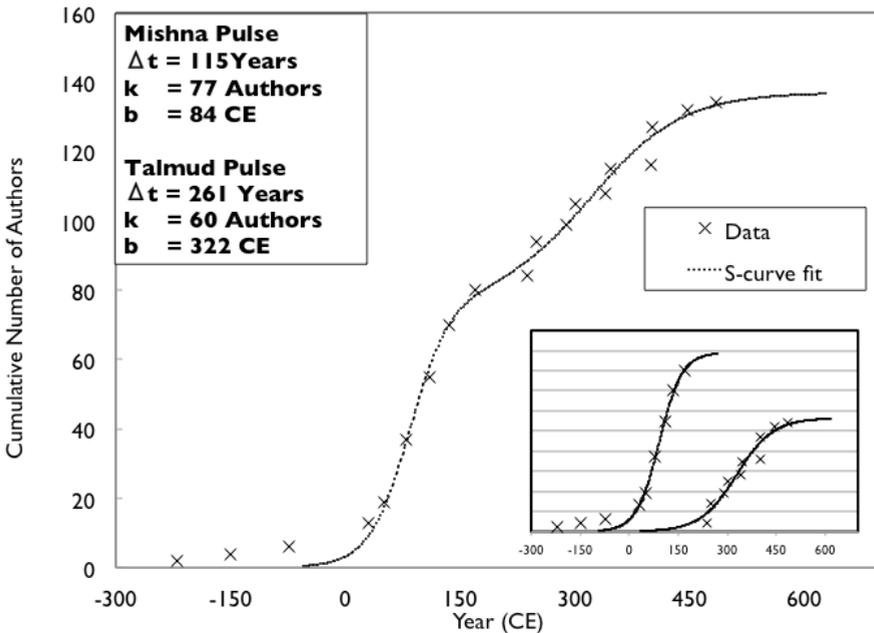


Figure 3. Cumulative number of authors of the Mishna and the Babylonian Talmud by birth year. Data sources: Rosner, 1994; The Jewish Encyclopedia. For more information, see Appendix 1 — Data Notes.

The earliest authors cited in the Mishna were born almost immediately following the canonization of the Hebrew Bible, in a world transitioning between Greece and Rome as the dominant world culture. The Mishna's latest authors were born as the power of the mighty Roman Empire began to wane. The final redactor of the Mishna, Rabbi Judah, was a contemporary and an intimate of "Antoninus," (Babylonian Talmud<sup>b</sup>), identified as either the emperor Marcus Aurelius (121-180 CE) or his predecessor Antoninus Pius (86-161 CE). The final codification of the Talmud coincides with the rise of Mohamed (622 CE). The major Talmudic academies were established in the same region that subsequently became the first major center for Islamic legal scholarship in what is present-day southern Iraq.

Analysis of the data on the main authors of the Talmud suggests two overlapping pulses spanning 600 to 700 years, corresponding to the development of the Mishna and the Talmud. Meyer (1994) describes the mathematics and analytic implications of such overlapping S-curves. The insert in Figure 3 explicitly shows these two separate S-curves. The midpoints for the two pulses roughly correspond to the destruction of the Jewish temple by the Romans in 70 CE and the conversion of the Roman emperor Constantine to Christianity (c. 320 CE). As with the Hebrew Bible, the midpoint of the process, representing the period of most vigorous intellectual activity, occurs at what would be key transition points in the national experience.

The Mishna/Talmud was conceived and written as an interpretative companion to the Hebrew Bible rather than a superseding text (Tribetz, 2008). The Talmud itself remains unique in its success in maintaining a tension between the inviolability of the original text and the ability to incorporate evolving interpretations over 1500 years. Through the Talmud, the entire canon grew steadily and remained sacrosanct at the same time. By recording the central laws and legal discussions in a single agreed-upon tome, the Talmud provided the basis for the social independence of individual Jewish communities as they spread to new locations around the globe. The Talmud continues to stimulate discussion and provide the primary source text for disputes regarding Jewish law and much of national life to this day.

### *Post-Talmudic Literature*

Scholars continue to debate the precise date between the middle of the 5<sup>th</sup> and the 7<sup>th</sup> centuries BCE when the Talmud was completed in its original form (Tribetz, 2008; Weiss-Halivni, 2009). Like the period following the canonization of the Hebrew Bible, the period subsequent to the redaction of the Talmud witnessed no new books entering the canon for several hundred years. Major works of rabbinic literature, all based on the Talmud, begin to appear around the year 750 CE and continue until today. Figure 4 shows the number of authors contributing to this next extended pulse of intellectual activity, beginning with the first books added to the canon after the Talmud and continuing to the 20<sup>th</sup> century.

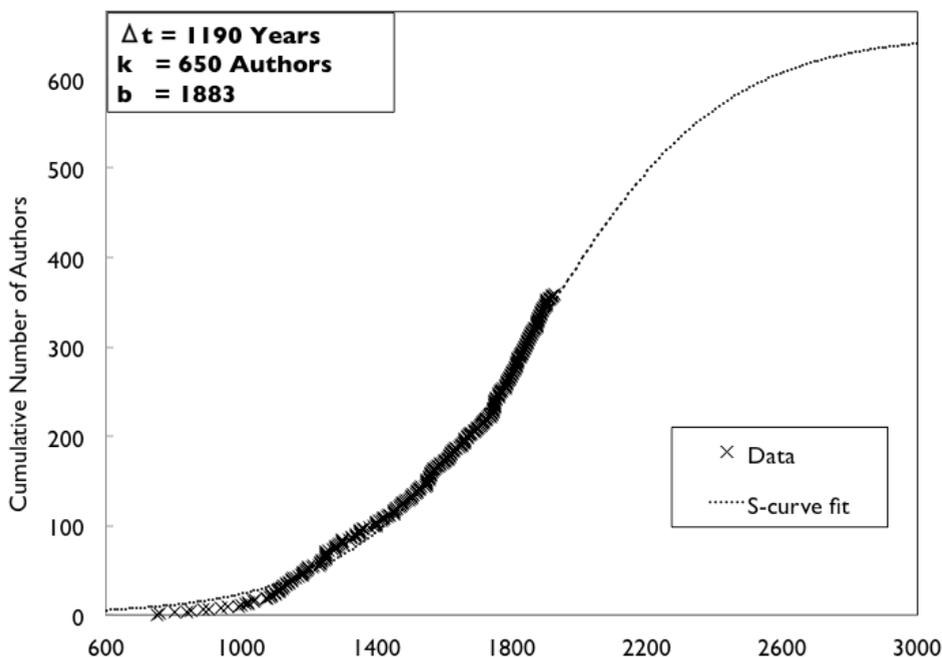


Figure 4. Cumulative number of authors of post-Talmudic rabbinic literature by author birth year. Data source: Bar Ilan Responsa Project, 2011. For more information, see Appendix 1 — Data Notes.

The single curve extends over two millennia and neatly fits over 11 centuries of literary production. The near-exponential rise in the development of post-Talmudic literature for more than a thousand years attests to its continuous constructive development and expansion. Later works achieved distinction through incremental advances that retained fealty to earlier work. Because classics require at least a century to secure their place in history, this analysis of the Jewish canon stops at the beginning of the 20<sup>th</sup> century. In Figure 4 the current pulse reached its midpoint, its period of most vigorous growth, in the late 19<sup>th</sup> century, the golden age of Talmud study in Eastern Europe, as the next section shows. The events of the 20<sup>th</sup> century created horrendous dislocations and also produced great scholars among the Jews. Perhaps only a vantage point several hundred years in the future will offer a proper perspective of the history of the Jews in the 20<sup>th</sup> century. The S-curve model projects continued growth of the Jewish canon for another 200 to 300 years, indicating continued cultural vitality on the horizon.

### Jews in Space

The growth of the Jewish canon took place in many locations around the globe corresponding to the major population movements of the Jewish people over centuries. With the publication of the Mishna (c. 200 CE), the center of mass of the Jewish people moved away from their ancestral home between the Jordan River and the Mediterranean Sea. The incessant mass migrations that would follow were motivated by the avoidance of persecution as well as a recurring attraction to rising centers of global commerce and culture. Peaks of Jewish cultural activity frequently coincided with the ascent of leading global cultures. Examples include the prominence of legal scholars in 10<sup>th</sup>-century Baghdad, poets in 13<sup>th</sup>-century Spain, logicians in 17<sup>th</sup>-century Italy, and scientists in 19<sup>th</sup>-century Germany and 20<sup>th</sup>-century United States.

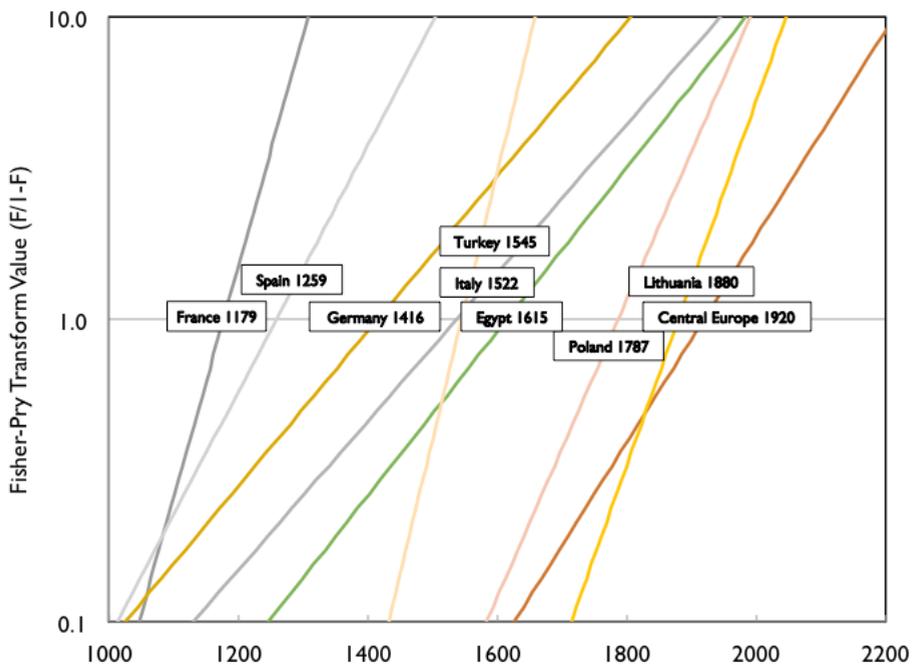


Figure 5. Linearized S-curves, or Fisher-Pry transforms (FPT), showing a succession of pulses associated with additions to the Jewish canon in the post-Talmudic period. The slope of each line indicates the characteristic duration of the literary activity in that location. Steeper is shorter. The location names are shown with the date of peak activity (the midpoint) in that location. For details on linearization of the S-curve, the “Fisher-Pry transform,” see Meyer et al. (1999). For more information on the area included for each location, see Appendix 2 - Geography Notes.

Disaggregating the main author dataset by the location of their birth and applying the same method of analysis also reveals pulses of activity over time. Figure 5 shows a linear representation of the S-curves corresponding to pulses indicating geographically centered additions to the Jewish canon occurring after the Talmud. The succession of individual pulses of activity occurring in different locations traces Jewish historical migratory patterns.

Until the middle of the 11<sup>th</sup> century, the center of Jewish scholarship remained in Babylon (modern-day southern Iraq), where it had resided since the times of the Talmud. By the early 12<sup>th</sup> century, the center of gravity of the Jewish world of scholarship began to move west, to North Africa and the European coast of the Mediterranean. From there, the centers of scholarship moved north into the Iberian Peninsula (Sepharad). Eventually, Spanish (and Portuguese) Jewry went on to nurture one of the most productive literary epochs in Jewish history, noted for its many contributions to Jewish law and also to philosophy, poetry, and the liturgy. Following the expulsion of Jews from the Iberian Peninsula at the end of the 15<sup>th</sup> century, they migrated en masse across the Mediterranean to Turkey, Syria, and present-day Israel. Others moved north and west, augmenting the growing population of Jews in Italy, the Netherlands, and Alsace-Lorraine (Ashkenaz). Still others journeyed to a New World on the other side of the ocean. Abraham Zacuto (1452-1515), a Portuguese rabbi and astronomer and one of the authors considered in this study, prepared the navigation maps for the voyages of Christopher Columbus to the New World (Zacuto, 1496).

The 16<sup>th</sup> and 17<sup>th</sup> centuries mark the beginning of an especially productive period of Jewish scholarship in Northern and Western Europe. Traditional scholarship would eventually move to Eastern Europe with centers of activity from the Baltics to the Black Sea. While post-Talmudic scholarship continues to thrive to this day, the intellectual contributions made by individual Jews to the more general intellectual global ferment becomes strikingly evident as modernity hit its stride by the 19<sup>th</sup> century. The modern period marks the beginning of greater openness to new ideas in Europe and the emergence of the modern sensibilities that argued for equal rights for all citizens without regard to their religion.

### **The Modern Era**

In *The New Atlantis*, a prescient account of a future society based on science and technology, Francis Bacon (1627) chooses “the Jew” as the prime agent mediating between the wisdom of the Old World and the promise of a modern science-based society. Bacon chose the Jew of the Middle Ages at a time when learned European men not under the auspices of the Church were rare. Though over time classical Judaism came to view modernity with suspicion, in the realm of the natural sciences, no doctrines existed in rabbinic Judaism that would reject theories about nature based on evidence from ob-

ervation. The style of abstract reasoning inculcated at early ages in Jewish pedagogy proved useful to scientific inquiry. In fact, it was a learned Jew of Spanish ancestry living in Amsterdam, Benedicto de Espinosa (Baruch Spinoza), who was among the first to articulate the religious and political sensibilities of a Europe emerging from the Middle Ages (Spinoza, 1670).

Jewish influence on Western culture can be seen in the steady rise of individuals gaining recognition for their contributions to the arts and sciences. Jewish contributions to the arts and sciences accelerated through the 19<sup>th</sup> and first half of the 20<sup>th</sup> centuries. Jewish Nobel Prize winners form a proxy for gauging Jewish contributions to the arts and sciences over this period (Figure 6).

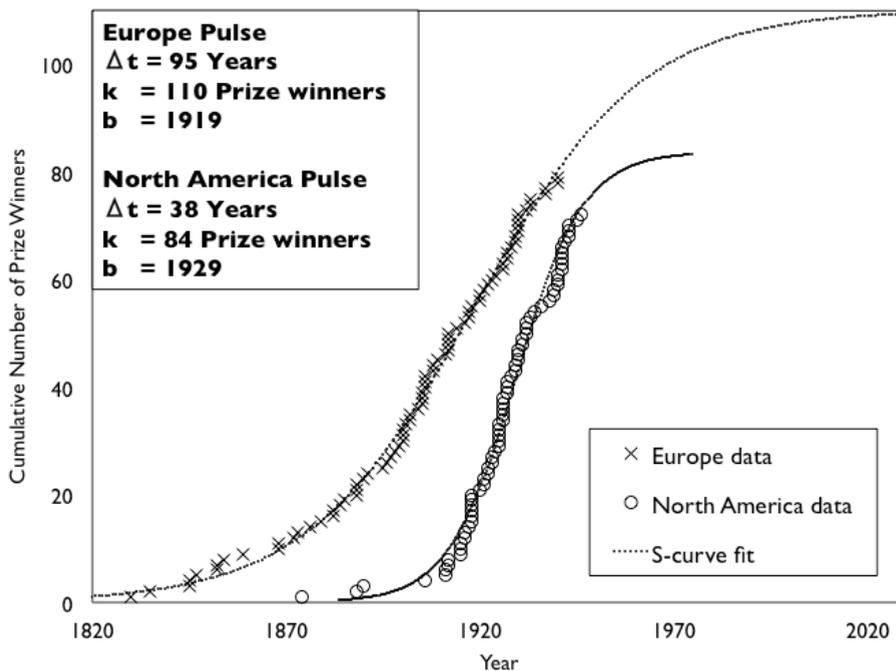


Figure 6. Cumulative number of Jewish Nobel Prize winners for Chemistry, Physics, Physiology or Medicine, Economics, and Literature born in Europe and the United States. Data source: Israel Science and Technology Homepage Jewish Nobel Prize Laureates, <http://www.science.co.il/Nobel.asp>.

The figure shows a strong pulse of European-born Jews covering several generations spanning the 19<sup>th</sup> and early 20<sup>th</sup> centuries. As with rabbinic literature in Eastern Europe, the pulse of European creativity is truncated, seemingly anticipating the events of the world wars and their devastating effect. Many of these European-born scientists migrated in their youth to North America, where they would contribute to American sci-

ence in areas ranging from number theory to hydrogen bombs. A further pulse becomes evident for first-generation, American-born Jews. Only 10 years separate the midpoints of the two curves, evidence of the large degree of overlap and rapid transition between Jewish culture in Europe and the United States. This second pulse, steeper than the first, seems to be nearing saturation. Since the year 2000, four Israeli-born Jewish scientists have won Nobel Prizes in Chemistry.

## **The Future**

According to the Hebrew Bible, the origins of the Jewish people begin with Abraham (c. 1800 BCE) in Ur in Mesopotamia and his migration to the Land of Canaan in the Levant. Modern scholars typically date the emergence of the Jewish people several centuries later. Freud (1939) argued that the Jews emerged from an array of local nomadic tribes that eventually coalesced under the leadership of an Egyptian prince named Moses. From those obscure beginnings, the global Jewish population has always remained small in absolute terms and relative to the global population. At its height during the time of the origins of Christianity, the Jewish population constituted 2.5% of the world's population. Today, it constitutes 0.2% of the world total (Baranavi, 1992) with fewer Jews around the world in 2015 than in 1939.

The cultural influence of Jews on Western civilization has been out of proportion with their small numbers. Rabbis from the early Islamic caliphates explored mathematics and philosophy together with their Islamic contemporaries. During the golden age, prominent Spanish Jews wrote poetry and created astronomical charts useful for ocean navigation. During the modern period, Jews in Western Europe embraced and greatly advanced the ethos of the scientific method and modern human psychology in their works. Even removed one or two generations, the probity and creativity of the Talmudic dialectic found its way into economics, physics, medicine, and literature. The Jews' distinction has not always been a blessing and their association with constant innovation was historically vilified as cosmopolitanism.

Although this study reveals no new historical facts, it attempts to frame some known history in a different, quantitative context made possible by the books, the leading artifact of Jewish culture. Boundless historical context could be added to describe any one of the more than 500 authors that populate the database used in this study. Nonetheless, the broad historical patterns captured by the analysis reveal a different but equally valid reality. For instance, in the development of the canon after the Talmud, individual communities act as if they are in concert with other Jews around the globe. Pulses of activity in different lands show a seeming teleological connection in contributing to the development of a single, common body of knowledge. The coherent behavior of Jewish culture, demonstrated here quantitatively, offers some possible explanation of its durability.

A further lesson from this study comes from the recurring patterns – brought into focus by the S-curves – over the entire course of Jewish history. The survivability of cultures lies not in their size but in their dynamics. The long-term diffusion of ideas over time and space is a function of cultural vigor and its rate of renewal. Viewed in this light, the survival of the Jewish people in the face of threats to crush them and dissolve them over three millennia can be attributed to a cultural vigor seen in sustained pulses of creativity across the stage of world history. How and where that vigor will take shape in the future remains unknown, but from this analysis, the drive that animates the Jewish people and their role in global society shows no sign of fading.

Today the vast majority of the global Jewish population is concentrated in two geographic centers: Israel and the United States. All conventional expectations forecast the development of the Jewish world in these areas of high concentration. But, given the propensity of Jews to concentrate in ascending centers of global commercial and cultural activity, this analysis offers another option. Could the next wave of Jewish culture take place in the one part of the globe where Jewish communities have scarcely existed, the Far East?

ACKNOWLEDGMENTS — My thanks go to Jesse Ausubel, with whom I developed many of the ideas presented here, for his assistance with the manuscript.

## **Appendix 1 - Data Notes**

### ***General Note***

All works selected for inclusion in this study were collected from the Bar Ilan Responsa database, version 19 (<http://www.biu.ac.il/jh/Responsa/books.htm>) accessed December 2011.

The database is not the authoritative voice on what comprises the canon of Jewish rabbinic literature. There is no single, authoritative voice. The database does represent an exceptionally learned distillation and organization of the most influential Jewish texts emerging over the centuries.

The database only includes the types of books one would find in an orthodox hall of study. Absent here are secular or Christian works authored by Jews (Paul, Philo, Josephus, Marx, Freud) or books about Jews or Judaism that are not part of orthodox rabbinic literature.

Data on Author birthdates and birthplaces were collected for works in the categories below. The 19<sup>th</sup> version of the Bar Ilan Responsa database is organized into 27 categories. Data were collected on the books in categories 1-3 and 11-27. Categories 4-9 represent volumes of edited legal and allegorical discussions not directly included. The main contributing authors to the books in categories 4-9 are accounted for as authors in the Mishna or the Talmud. The analyzed data also exclude works that are anthologies. Many of the cited authors wrote multiple books, two being the average. The list below

shows the categories used in the database for organizing Jewish biblical and Talmudic scholarship.

Categories used by Bar Ilan Responsa database, version 19 (Downloaded December 2011).

1. Hebrew Bible
2. Bible Commentaries
3. Mishna
4. Tosefta
5. Minor Tractates
6. Talmud Bavli (Babylonian Talmud)
7. Talmud Yerushalmi (Jerusalem Talmud)
8. Halachic Midrashim
9. Aggadic Midrashim
10. Zohar
11. Ge'onim
12. Mishna Commentaries
13. Rishonim on Talmud Bavli
14. Acharonim on Talmud Bavli
15. Halachah and Minhagim
16. Sifrei Mitzvot
17. Mussar and Jewish Thought
18. Rambam (Maimonides' Yad Ha-Chazakah)
19. Commentaries on the Rambam
20. Tur
21. Tur Commentaries
22. Shulchan Aruch
23. Commentaries on Shulchan Aruch
24. Shulchan Aruch Related Poskim
25. Sifrei Chasidut
26. Sifrei Kelalim and Seder Ha-Dorot
27. Responsa Literature: 17<sup>th</sup>-20<sup>th</sup> centuries

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Data on the birthdate and birthplace of authors were collected from multiple sources (See [http://phe.rockefeller.edu/docs/JST\\_historical\\_table.xls](http://phe.rockefeller.edu/docs/JST_historical_table.xls)). Birthdates are in some cases approximate. For instance, when mid-16<sup>th</sup> century is the only biographical reference cited, the year 1550 is used, or if only a date of death is given, 70 years are subtracted from that date to approximate a date of birth.

### ***Notes on the Hebrew Bible***

There is much historical debate surrounding authorship of the books of the Hebrew Bible. There is great disagreement about authorship, dating of personalities, and the emergence of distinct texts. Historians typically date the completion of the Bible, “The Canonization,” as occurring between 300 and 100 BCE, see Cohen (1988). Data presented here are based on authorship attributed in the Babylonian Talmud, Tractate Baba Batra 14b, 15a, and 15b. Authorship does not always match the date of events described in that author’s text. In addition, many biblical books contain no historical narrative and are entirely allegorical, e.g., Proverbs, Ecclesiastes, Job.

The Hebrew Bible comprises 24 books, or 35 if Minor Prophets are counted separately. Twelve Minor Prophets are treated as single books in the Hebrew Bible.

Because he is the primary author, David is considered the sole author of the Psalms.

Christian versions of the Hebrew Bible (the Old Testament) may include a slightly different list of books.

### ***Notes on the Mishna***

Most of the Mishna is related without attribution, indicating a consensus opinion among the sages or the decided opinion of the redactor of the Mishna, Rabbi Judah. According to Maimonides in his Introduction to the Mishna, 128 individuals are cited in the Mishna, 91 of whom offer more substantive contributions, and the remaining 37 are mentioned only in passing. Zacuto (1999) disputes some of these numbers. Larger lists of Mishna sages (134) also appear including individuals mentioned in other significant but less authoritative works produced during this era.

Sources for Mishna authorship include Maimonides, Abraham Zacuto (1999), The Jewish Encyclopedia, The Encyclopedia of Sages of the Talmud and the Gaonim, and Wikipedia.

### ***Notes on the Talmud***

A Jerusalem Talmud composed in the Galilee was completed around the year 350 CE. Though it remains an important source text, this earlier edition of the Talmud did not ultimately gain the scholarly attention of the rival Babylonian Talmud.

As an annotation to the Mishna, the text in the Talmud is far longer than its source text. The number of individuals cited in the Talmud is thus many times more than those cited in the Mishna, in the hundreds. This study considers only 54 sages that appear in the Jewish Encyclopedia under “Amoraim” (Talmudic sages) as “the most distinguished among them, especially those that presided over the great academies...”

## Appendix 2 - Geography Notes

Author birthplaces were categorized into the following geographic areas:

- Central Europe – Hungary, Austria, Czechoslovakia, Romania, Bulgaria, Ukraine, Bohemia
- Egypt
- France (much activity in Alsace region, both French and German, e.g., Worms, Mainz)
- Germany
- Iraq
- Israel
- Italy
- Lithuania - including Belarus
- North Africa (excluding Egypt) – including Algeria, Tunisia, Libya, Morocco
- Poland including Galicia
- Spain
- Turkey - including Constantinople, Thessalonica, Greece, and Syria
- Yemen

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