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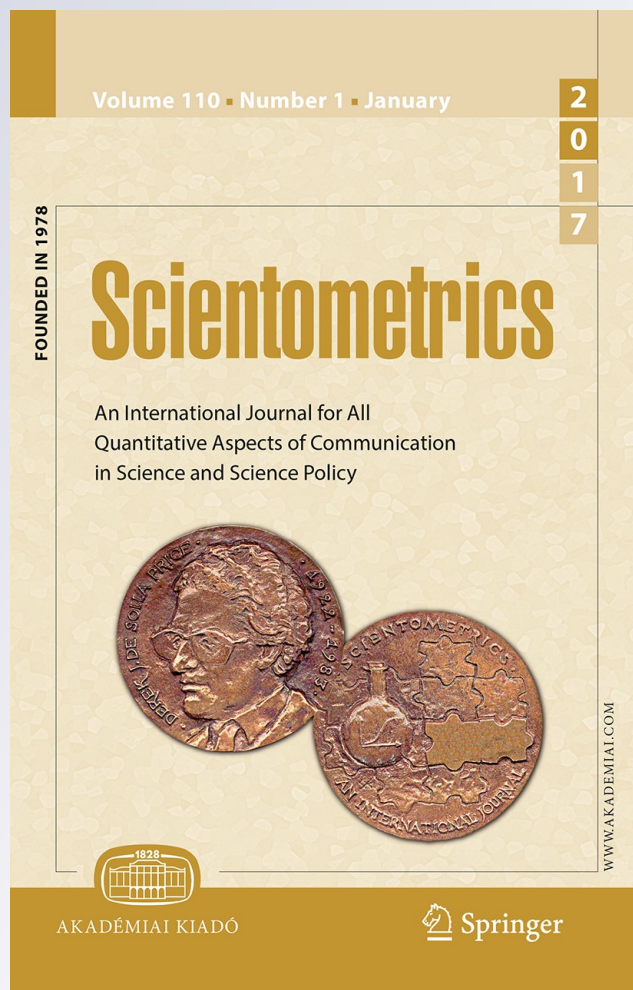
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Sleeping beauties in psychology

Yuh-Shan Ho¹ · James Hartley²

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Abstract A ‘Sleeping beauty’ is a term used to describe a research article that has remained relatively uncited for several years and then suddenly blossoms forward. New technology now allows us to detect such articles more easily than before, and sleeping beauties can be found in numerous disciplines. In this article we describe three sleeping beauties that we have found in psychology—Stroop (J Exp Psychol 18:643–662, 1935), Maslow (Psychol Rev 50(4):370–396, 1943), and Simon (Psychol Rev 63(2):129–138, 1956).

Keywords Citations · History of psychology · Web of Science · Science Citation Index Expanded

Introduction

A ‘sleeping beauty’ is a term that is often used to describe a research article that remains relatively uncited for several years and then suddenly blossoms forward. Perhaps the most well-known example is that of Mendel’s (1866) paper on plant hybridisation. This paper did not go entirely unnoticed but its significance was not appreciated for over 30 years before it then became much more widely known (Garfield 1980). This general phenomenon has been studied by several investigators over the years (Garfield 1980; Glänzel et al. 2003; Glänzel and Garfield 2004; Braun et al. 2010; van Raan 2004; Ke et al. 2015). Such ‘sleeping beauties’ can be distinguished from articles that are a ‘flash in the pan’—

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that is, articles that are highly cited at some particular point in their history and then promptly forgotten (Li 2014).

'Sleeping beauties' have been identified in several disciplines (Table 1) and also in specific journals. Li and Ye (2012), for example, present examples of delayed discoveries in *Nature* and Kozak (2013) describes and discusses ones in *Current Science*.

In this article we discuss three sleeping beauties in psychology—an area of study which, despite the brief paper by Lange (2005), has not been investigated in detail before.

Figures 1, 2, and 3 show the how each of the now famous papers by Stroop (1935), Maslow (1943), and Simon (1956) lay dormant for forty years or more before being awakened by a 'prince'.

Finding sleeping beauties and their princes

Modern computer-aided searching allows us to look for sleeping beauties in any discipline more easily and more thoroughly than before. Similarly, it is also possible to detect their 'princes'. Today, several different researchers have developed different tools for doing this (Wang et al. 2012; Li 2014; Du and Wu 2016). In this paper we describe the results that we obtained using a tool developed by Yu-Shan Ho, one of the authors of this paper (Ho 2014). This tool essentially measures the total number of citations for a paper over time and grouped in various categories.

More specifically we examined 303,255 documents in the Psychology category of the Science Citation Index Expanded database of the Web of Science (updated on 06 July, 2016). We used three main measures:

1. the total number of citations to a paper from initial publication to the end of 2015.
2. the total number of citations to a paper in 2015 only.
3. the total number of citations in the period of sleep.

The results were as outlined above: we found three sleeping beauties among these 303,255 citations to articles in psychology—those of Stroop (1935), Maslow (1943), and Simon (1956). Table 2 provides more details for these authors.

So, why are such papers dormant and then 'awakened' from their sleep? In this case there appears to be three reasons—one for each paper. Stroop provided a methodology that proved to be effective and easy to use in later studies in (different) areas of psychology.

Table 1 Articles on sleeping beauties in different disciplines

Disciplines	References
Linguistics and psycholinguistics	Levelt (2015)
Medical and biological engineering	Huang et al. (2015)
Ophthalmology	Ohba and Nakao (2012)
Philosophy	Healy (2015)
Physical and engineering sciences	van Raan (2015)
Psychology	Lange (2005)
Radiology	Gorry and Ragouet (2016)
Science	van Raan (2004), Ke et al. (2015), Li and Ye (2016)

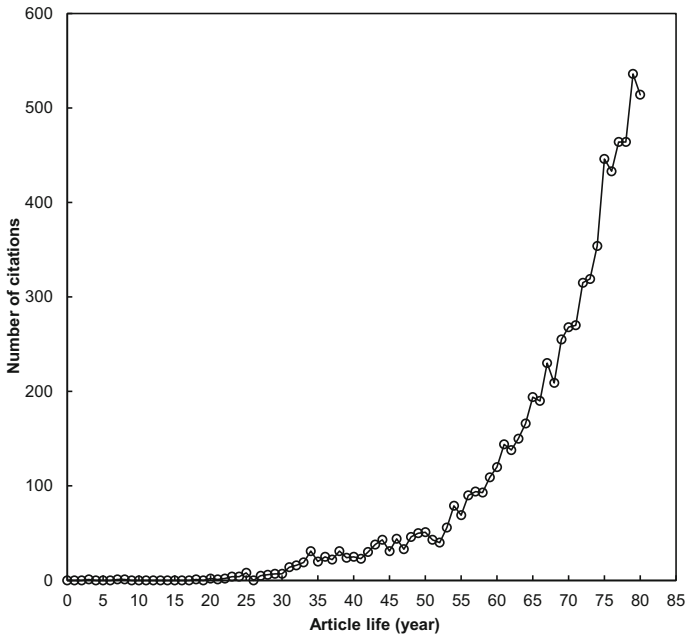


Fig. 1 The Sleeping Beauty life of Stroop (1935)

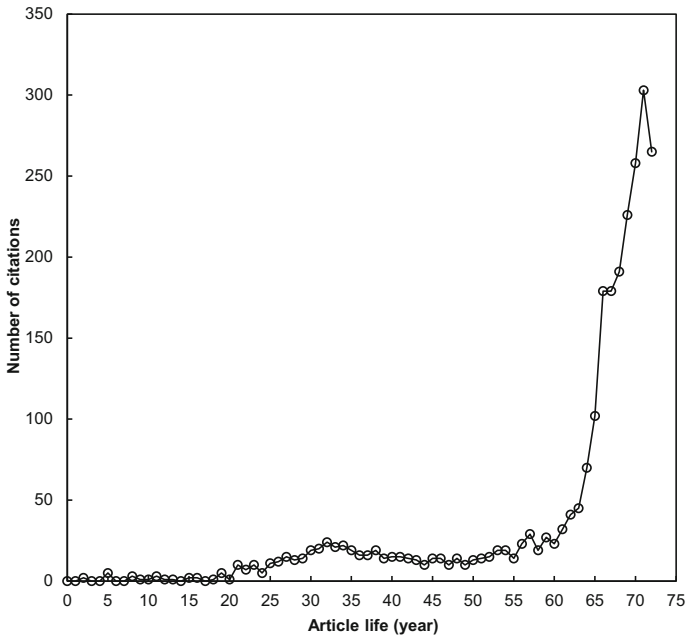


Fig. 2 The Sleeping Beauty life of Maslow (1943)

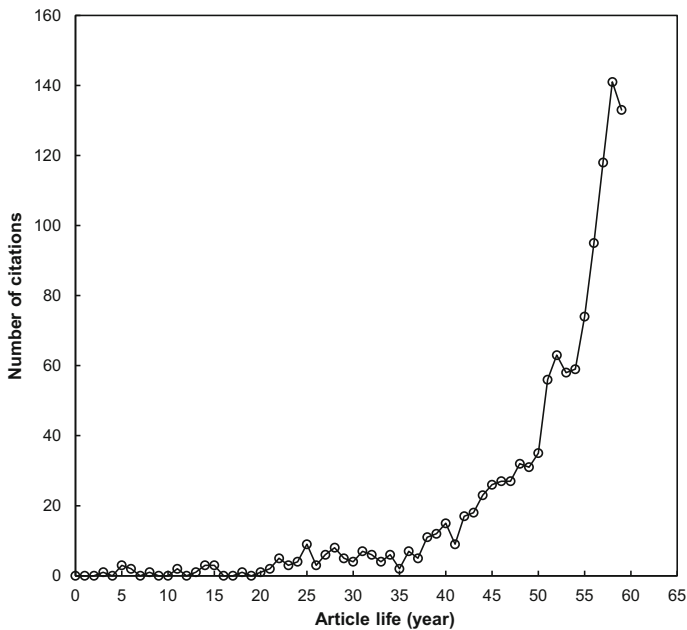


Fig. 3 The Sleeping Beauty life of Simon (1956)

Table 2 Comparison data for three sleeping beauties in psychology

Author/date of publication	Total no. of citations	No. of years sleeping	No. of citations when sleeping
Stroop (1935)	7518	32	64
Maslow (1943)	2550	23	45
Simon (1956)	1184	29	58

Maslow's notions about the nature of psychology—initially unpopular and idiosyncratic—came into fashion as psychology became more person-centred in the 70s. Simon was prescient enough to see how computer-aided models of decision making grounded in economics would develop in psychology but it took time for other people to realise this.

However, what we have *not* shown in this article is *why* these particular papers were awakened after such delays, and who by. Subsequent analyses are needed to discover who made the citations that led to the re-discovery of these papers, and whether or not today these sleeping beauties are simply footnoted in passing as having made a major contribution to the field, and then ignored.

Finally, it is perhaps worth observing that there may still be sleeping beauties out there undetected, or about to be awakened. We note with interest that Schwarz and Pfister (2016) have recently re-discovered the work of Ferdinand Ueberwasse (1752–1812) writing about psychology as a discipline approximately 100 years before Wilhelm Wundt...

Author contributions Y-SH and JH discussed the possibility of this paper. Y-SH collected and analysed the data. JH and Y-SH wrote the manuscript.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest with respect to their authorship or the publication of this paper.

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