Imaging and Sleeping Beauty - A case for double-halfers

Mikaël Cozic

(ENS Ulm)

Sleeping Beauty's story is well-known. On sunday evening (t0), Sleeping Beauty is put to sleep by an experimental philosopher. She is awaken on monday morning and at this moment (t1), the experimenter doesn't tell her which day it is. Some time later (t2), she is told that it's monday. At this point, what follows depends on the toss of a fair coin. If the result of the toss is heads, then Sleeping Beauty is put to sleep until the end of the week. If the result is tails, then Sleeping Beauty is awaken on tuesday morning. The crucial fact is that the drug that is given to her is such that she cannot distinguish her awaken on monday from her awakening on tuesday: Sleeping Beauty has a kind of memory erasure.

We are interested in the credence that Sleeping Beauty puts on the proposition that the result of the toss is heads (HEADS). More precisely, the two crucial moments are t1 - when Sleeping Beauty is just awaken on tuesday - and t2 - when Sleeping Beauty has learned that it's tuesday. I coin the first question Q1 and the second Q2. I will adopt the following notation:

• P1 is Sleeping Beauty's credence at t1 ie at her awakening on monday morning
• P2 is Sleeping Beauty's credence at t2 ie after having learned that it's monday

What should be the value of P1(HEADS)? There are basically two positions: the halfers and the thirders. The thirders claim (after A. Elga) that P1(HEADS) = 1/3 whereas the halfers claim (after D. Lewis) that P1(HEADS) = 1/2. Now, the answer to Q1 is intimately linked to the answer to Q2. As a consequence, the two positions are best described by giving their answer to both questions. By conditionalization, one obtains P2(HEADS) = 1/2 for the thirders and P2(HEADS) = 2/3 for the halfers.

We can sum up the positions of Lewis and Elga as follows :

	A. Elga	D. Lewis
Q1	1/3	1/2
Q2	1/2	2/3

Both Elga's and Lewis' basic intuitions are appealing. Elga's intuition is that the coin could be tossed on monday night and that in this case, one should endorse the objective probability of HEADS as her or his credence. Lewis' intuition is that on monday morning, there is no new evidence that is relevant to the credence concerning HEADS. Therefore the credence toward HEADS at t1 should remain the same than at t0. The aim of this paper is to propose a case for reconciling these conflicting intuitions. More pr cisely, I will argue that there is a way to vindicate a double-halfer position according to which P1(HEADS) = P2(HEADS) =1/2. My case is based on a recent theoretical exploration of probabilistic change rules (see B. Walliser and D. Zwirn, 2002) that shows that whereas bayesian conditionalization may be justified for revising contexts the much less known rule of imaging (D.K. Lewis, 1976) seems to be the appropriate one for updating contexts. Applying the imaging rule instead of bayesian conditionalization in the Sleeping Beauty story results in a double-halfer position.