HW #5 Solutions

Point Values

Each part of the homework assignment was worth 9 points. 1 point was free.

5.1 Die Factories

5.1.a Principle of Indifference

Let F be the proposition that the die comes from the Fair Factory, S that the die coms from the Snake-Eyes Factory, and B that the die comes from the Boxcar Factory. By the Principle of Indifference $\mathrm{cr}(F) = \mathrm{cr}(S) = \mathrm{cr}(B) = 1/3$.

Since F, S, B are mutually exclusive and jointly exhaustive $\mathrm{cr}(3) = \mathrm{cr}(3|F) \cdot \mathrm{cr}(F) + \mathrm{cr}(3|S) \cdot \mathrm{cr}(S) + \mathrm{cr}(3|B) \cdot \mathrm{cr}(B)$

Since the Fair Factory produces fair dice, the Principal Principal dictates that $\mathrm{cr}(3|F) = 1/6$. Since the Snake-Eyes Factory produces dice with a $1/2$ chance of coming up on any number 2-6, and the chances of any of these numbers are equal, the Principal Principle dictates that $\mathrm{cr}(3|S) = 1/10$. Similarly, $\mathrm{cr}(3|B) = 3/20$.

Putting this all together, $\mathrm{cr}(3) = 1/6 \cdot 1/3 + 1/10 \cdot 1/3 + 3/20 \cdot 1/3 = 5/36$

5.1.b Maria's Evidence

After updating on $\sim B$, $\mathrm{cr}_2(F) = \mathrm{cr}_2(S) = 1/2$. So we calculate $\mathrm{cr}_2(3) = \mathrm{cr}_2(3|F) \cdot \mathrm{cr}_2(F) + \mathrm{cr}_2(3|S) \cdot \mathrm{cr}(S) = 1/6 \cdot 1/2 + 1/10 \cdot 1/2 = 2/15$

5.1.c Admissibility

Maria's evidence is admissible. Information about what factory the die came from is information about the chances. Since your credence in an event's occurring (the die lands 3) changes by way of a change in opinion on the chances (that the die didn't come from the Boxcar Factory), this evidence is admissible.

5.1.d Ron's Evidence

We want to find $\mathrm{cr}_3(3)$. Since, between t_2 and t_3, you update on ~ 6, $\mathrm{cr}_3(3) = \mathrm{cr}_2(3|\sim 6)$.

By Bayes' Theorem, $\mathrm{cr}_2(3|\sim 6) = \dfrac{\mathrm{cr}_2(\sim 6|3) \cdot \mathrm{cr}_2(3)}{\mathrm{cr}_2(\sim 6)}$. Since the die's landing 3 entails that the die doesn't land 6, $\mathrm{cr}_2(\sim 6|3) = 1$. We already know $\mathrm{cr}_2(3)$. This just leaves $\mathrm{cr}_2(\sim 6)$.

$\mathrm{cr}_2(\sim 6) = 1 - \mathrm{cr}_2(6) = 1 - [\mathrm{cr}_2(6|F) \cdot \mathrm{cr}_2(F) + \mathrm{cr}_2(6|S) \cdot \mathrm{cr}_2(S)] = 1 - 2/15 = 13/15$.

Putting this all together $\mathrm{cr}_3(3) = \dfrac{1 \cdot 2/15}{13/15} = 2/13$

5.1.e Admissibility

Ron's evidence is inadmissible. The information that you get from him is information directly about the outcome of the flip. It does not change your opinion by way of changing your opinion about the chances.

6.1 Triviality of Confirmation

Suppose the Special Consequence Condition and Converse Consequence Condition were both true. Show that under those assumptions, if evidence E confirms some proposition H relative to K, then relative to K evidence E will also confirm any other proposition X we might choose. (Hint: Start with the problem of irrelevant conjunction.)

$X \,\&\, H \,\&\, K \vDash H$. Since E confirms H relative to K, the Converse Consequence Condition entails that E confirms $X \,\&\, H$ relative to K (let $H' = X \,\&\, H$ for this instance of the Converse Consequence Condition).

$X \,\&\, H \,\&\, K \vDash X$ and we've already shown that E confirms $X \,\&\, H$ relative to K, so the Special Consequence Condition entails that E confirms X relative to K.

6.6 r-measure

Provide examples showing that the r-measure of confirmation violates each of the following constraints:

6.6.a Hypothesis Symmetry

Let $E = H$ and suppose $0 < \Pr(H) < 1$, then

$$r(H, E) = r(H, H) = \log\left[\frac{\Pr(H|H)}{\Pr(H)}\right] = \log\left[\frac{1}{\Pr(H)}\right] \neq \infty = -\log 0 = -\log\left[\frac{\Pr(\sim H|H)}{\Pr(\sim H)}\right] = -r(\sim H, H)$$

6.6.b Logicality

Consider $E = H$ with a Pr and X such that $0 < \Pr(H) < \Pr(H \vee X) < 1$. Then

$$r(H, E) = \log\left[\frac{\Pr(H|E)}{\Pr(H)}\right] = \log\left[\frac{\Pr(H|H)}{\Pr(H)}\right] = \log\left[\frac{1}{\Pr(H)}\right]$$
$$\neq \log\left[\frac{1}{\Pr(H \vee X)}\right] = \log\left[\frac{\Pr(H \vee X|H)}{\Pr(H \vee X)}\right] = \log\left[\frac{\Pr(H \vee X|E)}{\Pr(H \vee X)}\right] = r(H \vee X, E).$$

This violates logicality since $E \vDash H$ and $E \vDash H \vee X$

6.8 Crupi, Tentori, and Gonzalez

Crupi, Tentori, and Gonzalez think it's intuitive that on whatever measure c correctly gauges confirmation, the following constraint will be satisfied for cases of disconfirmation but not confirmation:

$$c(H, E) = c(E, H)$$

6.8.a Confirmation

Provide an example of a real-world E and H such that, intuitively, E confirms H but H does not confirm E to the same degree. (Don't forget to specify what Pr distribution you're relativizing your confirmation judgments to!)

Consider a Pr distribution that is indifferent between any one of the 52 cards from a deck's being drawn. Let E be the proposition that the card drawn is a heart. Let H be the proposition that the card drawn is the Jack of hearts. Here, $\Pr(E|H) = 1$ but $\Pr(H|E) = 1/13$. Intuitively, that the card is a heart does not confirm that it's the Jack of hearts very well. But that the card is the jack of hearts entails - and so maximally confirms - that it's a heart.

6.8.b Disconfirmation

Provide an example of a real-world E and H such that, intuitively, E disconfirms H and H disconfirms E to the same degree. (Don't make it too easy on yourself–pick an E and H that are not logically equivalent to each other!)

There are many examples that could fill this role. An easy one is that any two mutually exclusive propositions seem to disconfirm each other to the same - maximal - degree. So let E be the proposition that a coin lands heads and H be the proposition that a coin lands tails.

6.8.c Your Opinion

Does it seem to you intuitively that for any E, H, and Pr such that E disconfirms H, H disconfirms E to the same degree? Explain why or why not.

Many answers are acceptable.