Having Knowledge from Multiple Testimonies: Reply to Tucker's "The Generation of Knowledge from Multiple Testimonies"
Frank Zenker, Konstanz University

Aviezer Tucker's non-reductive, genealogical account of *knowledge from multiple testimonies* (KMT) is informed by, and seeks to square with, the professional praxis of such folk as historians, journalists, detectives, or judges. This reply seeks to add precision to Tucker's account by chancing definitions of key-terms. The final section particularly stresses the difficulties of ascertaining whether one *has* KMT on some occasion, or not.

Knowledge from Multiple Testimonies Genealogically Understood

Information that is revealed by non-humans may perhaps count as testimonial, too. More narrowly, for Tucker, *T is a testimony* if, and only if,

> (i) T is a human natural language utterance conveying the propositional content *p*;
>
> (ii) Whose correct interpretation maps *p* onto the information content I(T); such that;
>
> (iii) I(T) reports some contingent state of affairs SA at a level of detail D. (Let it pass whether *p*, I(T), SA, and D are open to measurement other than by intersubjective agreement among competent speakers.)

Provided that a pair of testimonies, T_1 and T_2, coheres *simpliciter* with respect to its information content, i.e., if $I(T_1 \cap T_2) \neq \varnothing$, or coheres significantly, i.e., if $I(T_1 \cap T_2) >> I(T_1 \cup T_2) - I(T_1 \cap T_2)$, extant formal or conceptual approaches tend to view it as a necessary condition for KMT that—irrespective of a preferred coherence measure— T_1 and T_2 be *independent* in the sense of satisfying the causally interpreted Markov condition.

The justification is plain: testimonial coherence plus testimonial independence can constitute jointly sufficient conditions for KMT, provided fallible rather than infallible knowledge is assumed. But if T_2 causally depends on T_1, or vice versa, then not discounting on either testimony would amount to *registering the same evidence twice*. In order to generate knowledge, of course, such double-counting must be avoided.

Tucker's account interestingly differs in this respect because it does not postulate causal independence, which other accounts do "by fiat," as he puts it. He rather accepts as an empirical fact, that causally *de*pendent testimonies may nonetheless generate KMT in the sense of a sufficiently probable degree of belief in I(T) with some audience. For instance, witness W_2 coming to learn that witness W_1 has testified on some issue may, and regularly does, motivate witness W_2 to testify to the same issue; in special cases this may even license W_2 to do so.

Causal dependence of testimonies thus being embraced, such that T_1 may well trigger T_2, Tucker situates the relevant notion of 'testimonial (in)dependence' not at the level of information reports, but at the level of their information contents. For Tucker, then, *the members of a set of testimonies* $\{T_1, \ldots, T_{n-1}, T_n\}$ *are independent* if, and only if,

> (i) T_1 is the source of the information content I(T); and

> (ii) T_n does not transmit information received from T_{n-1}.

This move runs counter to a standard probabilistic construal—where T_1 *and* T_2 *constitute mutually independent events* if, and only if, $P(T_1|T_2)=P(T_1)$ and $P(T_2|T_1)=P(T_2)$—thus rendering much of what on empirical grounds counts as KMT a causally dependent affair. Telling a case of KMT apart from one of *non*-KMT hence requires tracing the flow of information, i.e., its transmission from a source to a testimony. This makes Tucker's a genuinely genealogical account. For the "easy" version of KMT, we have it that (i) T_1 and T_2 cohere, and (ii) the transmission flows that link the information source to its testimonies do *not* intersect. This version of KMT is also recognized by extant accounts whenever non-intersecting information transmission flows go together with the causal independence of testimonies.

By contrast, according to Tucker, when transmissions *do* intersect then one deals with the "hard" version of KMT, which—in virtue of violating the (causal) Markov condition—extant accounts tend not to recognize as such. Moreover, evaluating whether one faces a case of KMT or of *non*-KMT now demands recourse to the genealogical reliability of the testimonies. Standardly, a testimony T expressing the propositional content *p* is reliable, provided the probability of its (correctly interpreted) information content, I(T), being communicated is greater if I(T) is true, than if it is false; in form: $P(T|I(T)$ is true)$>P(T|I(T)$ is false).

For Tucker, *a set of testimonies* $\{T_1, \ldots, T_{n-1}, T_n\}$ *is genealogically reliable to degree r* if, and only if,

> (i) T_1 is the source of information;

> (ii) T_n marks the end of the transmission process; and

> (iii) T_n preserves information conveyed in T_1 such that $0 \leq r \leq 1$, where $r=0$ if $I(T_1 \cap T_n)=\varnothing$, and $r=1$ if $I(T_1 \cup T_n)-I(T_1)=I(T_n)$.

This renders identical information content genealogically maximally reliable, and completely diverging content genealogically maximally unreliable.

Evaluating the parameter *r* now requires, among other things, to (somehow) order $\{T_1, \ldots, T_{n-1}, T_n\}$ according to a factual history, thereby reaching the ordered sequence $\langle T_1, \ldots, T_{n-1}, T_n \rangle$. The measure of genealogical reliability for a given such sequence of testimonies would then have to be the same as the measure of testimonial coherence for a given pair

of testimonies, now deployed iteratively. After all, it cannot do to measure coherence only at the endpoints, for T_1 and T_n may perfectly cohere only because some earlier tuple, say $\langle T_{n-4},\ T_{n-3} \rangle$, introduced information content *perfectly incoherent* with T_1 which, however, for some reason vanished from, say $\langle T_{n-2},\ T_{n-1} \rangle$, only to be replaced by $I(T_n)$.

In Fact *Having* Knowledge from Multiple Testimonies

As the genealogical approach to KMT is put to work, upon having (correctly) interpreted each member of $\{T_1,\ \ldots,\ T_{n-1},\ T_n\}$ in terms of their information content, those evaluating $\langle T_1,\ \ldots,\ T_{n-1},\ T_n \rangle$ with respect this sequence's coherent "information slice" being veridical must determine, in the first stage, how probable it is that information content coheres as the result of a common source, as opposed to multiple sources. Tucker suggests that *coherent and detailed* (i.e., information rich) testimonies are more likely than not to reflect a common source; and that *coherent but information poor* testimonies are more likely than not to reflect multiple common sources—*ceteris paribus*, one should add. The evaluation must moreover be sensitive to the testifiers' various interests being satisfied through their testifying, i.e., to any advantages they could thereby gain. If testifiers cannot be assumed to act against their interests, Tucker submits, then their clearly standing to gain from *falsely* testifying I(T) increases the likelihood of a common source, while the likelihood of receiving testimonies that conflict with testifiers' interests given different information sources is low. Again, such claims carry a *ceteris paribus* clause.

Provided now that a common source of a set of testimonies *is* likely, in the second stage, evaluators are burdened with collecting evidence of the actual pattern of information flow that gave rise to the testimonies. Of the five possible patterns that Tucker presents, KMT can be generated by single information sources or by multiple common information sources (see his figures: 1, page 13; 2, page 14; and 5, page 15), for only these patterns leave the relevant testimonies independent in the sense that their information contents directly reflect the source(s) of information; mixed cases require separating independent signals from dependent noise. Obviously, noting that such evidence 'need not be cheap to come by' is to offer an understatement.

In the third and final stage of evaluation, according to Tucker, for KMT to in fact be had, the probabilities of *all* alternative hypotheses regarding the actual source of information must be compared in the light of background knowledge. KMT thus arises, if it does, as a partial function of the particular probability value marking the apt threshold for fallible knowledge in a relevant context, and as a partial function of the probability of an exhaustive set of alternative hypotheses under which the same testimonies do not signal information that is likely to be veridical. Exhaustively specifying this set of course depends on the agent's or the collective's ability to generate alternative hypotheses, which is a highly contingent affair. And correctly evaluating the probability of any such hypothesis faces all genuine issues of evaluating the inductive support that data lend to hypotheses. At this last stage, at any rate, what might have *seemed* to be a case of KMT can fall apart; similarly, what should rather not count as KMT might nonetheless be accepted as such by some agents. Indeed, all appears to depend on the individual case.

On Tucker's account, then, as we saw, *a set of testimonies* $\{T_1, \ldots, T_{n-1}, T_n\}$ *generates a form of fallible knowledge, i.e., a sufficiently probable degree of belief*, if, and only if,

1. Each of $T_1, \ldots, T_{n-1}, T_n$ is correctly interpreted with respect to the information content, I(T), that it conveys.

2. Ordered according to actual history, the sequence $\langle T_1, \ldots, T_{n-1}, T_n \rangle$ remains sufficiently coherent in information content.

3. Each of $T_1, \ldots, T_{n-1}, T_n$ originates either with a single information source or with multiple common information sources.

4. The transmission flows that let $\langle T_1, \ldots, T_{n-1}, T_n \rangle$ channel information from a source to a receiver either do not intersect, or their independent signal can be separated from dependent noise.

5. The probability of the coherent "slice" of (the information content conveyed by) the sequence $\langle T_1, \ldots, T_{n-1}, T_n \rangle$ being veridical is sufficiently high conditional on all alternative hypotheses.

Pace the issue of measuring the relevant quantities in quasi-objective ways, and *pace* the break with a standard probabilistic notion of independence, it always falls upon agents or collectives who evaluate particular cases of testimonial coherence to decide whether they face an instance of KMT, or not. At low knowledge thresholds, of course, lots can pass for knowledge that might not be. And that may matter, too! In some of the jurisprudential literature, for instance, numerical likelihood ratios, *n*, are endorsed as sufficient for a judge or jury to convict a suspect on circumstantial grounds, i.e., when the assumption of the suspect's guilt must make the available evidence *n* times more likely than when assuming her innocence. The exact value of *n* thus features centrally in any assessment of *having* KMT, or not, and directly depends on the set of all alternative hypotheses. In short, Tucker's account seems to get KMT right. But one may well doubt whether *KMT with a capital K*, i.e., a strong form of knowledge, is very often had under actual conditions.

Contact details: frank.zenker@fil.lu.se

References

Tucker, Aviezer. "The Generation of Knowledge from Multiple Testimonies." *Social Epistemology* (2015): 1-22. doi:10.1080/02691728.2015.1065927.