



Principle of relativity for forensic comparison

Sir,

Insofar as comparative analysis is concerned, forensic science utilizes scientific principles to approach matter, exhibit, clue, evidence, and meta-evidence (evidence of evidences). Under this obligation, forensic cases are broadly guided by Locard's law of transfer and Kirk's principle of individualization [1,2]. According to these notions, transfer of clues must take place so that the investigator is able to assign the clues to the known source by means of identifying, individualizing, associating, and reconstructing. Not long ago, Inman and Rudin posit that the matter (or the item of evidential value) must first divide into clues before they can be transferred [3].

While decoding clues, six basic concepts are still predominantly used to guide forensic interpretation of evidence [3]. These concepts are profoundly intertwined with the two foregoing notions about transfer and individualization [4]. The concepts can be summarized as follows [1-7] [Table 1].

In thinking of the six concepts, the proponents seem too optimistic about the power of evidence in providing positive identification. A so-called "truth" makes sense because it assumes that the criminal's (e.g., murderer's) items (e.g., blood, hair, and sweat) were first divided and dislodged from him/her and then got transferred to the crime scene. Those items were identified (e.g., blood by Kessler Mayer's test, hair by microscopic examination, sweaty fingerprint by brushing with carbon) and individualized (e.g., blood by DNA profiling, hair from physical structures, fingerprint based on unique ridge features) before they were associated with the criminal through reconstruction of how he/she had left them at the scene. In other words, any transferred items would be promising in affirming the six concepts. By far, no theory has yet been proposed to compensate for the pessimistic side of these concepts. To illustrate, one may consider that the DNA profiled from a blood specimen recovered from a crime scene can be linked with a criminal when the target markers show a perfect match. Loopholes are that the

forensic expert does not profile the whole genome to arrive at the "truly perfect match" conclusion.

To deal with loopholes, it is best proposed that all things are literally compared in relative rather than absolute term - the principle of relativity, and this new concept adds to the forensic dimension and states:

An entity must disintegrate into sub-entities for transfer. These sub-entities shall share a common set of individualistics. As every physical matter tends to change every moment it comes into contact with different conditions, the sub-entities will eventually lose their original identities, thereby showing discrepancies with their parental entity. Hence, the conventional belief that nothing under the Sun is identical remains truthful. Any two objects coming from the true source will show similarity and difference in relative term.

The term relativity further takes into account four corollaries and forms the basic ground for forensic comparison. Corollary 1: *Nothing is truly homogenous; things are always heterogeneous by nature.* Every indivisible entity will live their own life. A general structure is made up of its constituent entities. Each entity has its self-defined identity. For example, a bag of illicit drug seized from a trafficker will inevitably show variation among its smaller parts [4,8]. Regardless of how carefully and thoroughly the entire sample has been homogenized, variation remains extant. In essence, the claim of homogeneity at the time of analysis strictly refers to the fact that "all parts are 'relatively' homogeneous."

Corollary 2: *Falsities must be present; perfect match shall mean relative match.* For example, no two identical objects can show 100% match in their physical or chemical features. Falsities can still be found in the claimed certainty. When we examine torn paper fragments, the complimentary edges seem to be perfectly or exactly matched. If the edge is scrutinized, falsities such as unmatched parts do exist. So, the claim of "match" may be nullified if one says both fragments are perfectly matched. Hence, the principle of relativity permits falsities for the matched sides to show differences – the relatively unmatched parts.

Corollary 3: *Things from a single source will only retain similarity in relative term.* As Corollaries 1 and 2 are inevitable by nature, the claim of similarity between items will achieve a level of similarity that only means "relatively similar" because some variation and falsities present in each examined item cannot

Table 1: Six basic concepts of forensic science

No	Concept	Description
1	Divisibility/ disintegration	Division of clues from the parental structure
2	Transfer	Migration of clues from the parental structure
3	Identification	Giving a general identity to a clue
4	Individualization	Segregating one clue from another
5	Association	Linking clues to a person, object, event, etc.
6	Reconstruction	Mapping out a criminal event based on clues

be overcome. For example, a fingerprint that matches that of Candidate A is only based on a set of predetermined features. Variation in terms of the length of the ridge and falsities in other unselected features could still be found.

Corollary 4: *Relativity is quantitative in time, space, and physical object.* Only quantifiable features can be compared and contrasted in relative term. The level of the match depends on when, where and which part of the item is examined/analyzed. For example, the alkaloid contents in two heroin samples originating from the same source will exaggerate variation and falsities because the alkaloids are unstable - time dependent [9,10]. The storage conditions - space also affect the stability [11]. The outer layer of the sample is less stable than the core due to exposure to sunlight. So, in line with Corollary 1, no two samples are 100% or homogeneously similar. If they retain a significant level of similarity, the similarity is only relative, and the level of relativity (e.g. relatively high/low similarity) depends on the aforesaid factors - time, space, and physical object.

Kar-Weng Chan

Department of Chemistry Malaysia, Ministry of Science, Technology and Innovation, Petaling Jaya, 46661 Malaysia

Address for correspondence:

Kar-Weng Chan, Department of Chemistry Malaysia, Ministry of Science, Technology and Innovation, Petaling Jaya, 46661 Malaysia.
E-mail: chankarweng@yahoo.com

Received: September 29, 2015

Accepted: October 27, 2015

Published: November 10, 2016

REFERENCES

1. Locard E. L'Enquê^te Criminelle et les Methodes Scientifiques. Paris: Flammarion; 1920.
2. Kirk PL. The ontogeny of criminalistics. J Crim Law Criminol Police Sci 1963;54:235-8.
3. Inman K, Rudin N. The origin of evidence. Forensic Sci Int 2002;126:11-6.
4. Chan KW, Tan GH, Wong RCS. Looking at forensic intelligence from the metaphysical perspective: Citing illicit heroin profiling as an example. Aust J Forensic Sci 2012;44:227-42.
5. DeForest P, Gaensslen R, Lee H. Forensic Science: An Introduction to Criminalistics. New York: McGraw Hill; 1983.
6. Kirk PL. In: Thornton J, editor. Criminal Investigation. 2nd ed. New York: Wiley; 1974.
7. Osterburg JW. The Crime Laboratory: Case Studies of Scientific Criminal Investigation. Bloomington: Indiana University Press; 1968.
8. Chan KW, Tan GH, Wong RCS. Statistical validation for the profiling of heroin by associating simulated postcut samples with corresponding precut samples. J Forensic Sci 2013;58:S199-207.
9. Zhang D, Shi X, Yuan Z, Ju H. Component analysis of illicit heroin samples with GC/MS and its application in source identification. J Forensic Sci 2004;49:81-6.
10. Sibley JA. Formation of O-6-acetylmorphine in the 'homebake' preparation of heroin. Forensic Sci Int 1996;77:159-67.
11. United Nations Office of Drugs and Crime. Methods for Impurity Profiling of Heroin and Cocaine. Vienna: United Nations; 2005.

Source of Support: Nil, Conflict of Interest: None declared.