The use of sensitivity and specificity in verification of Hadith’s chain of transmission centuries ago

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Abstract
Sensitivity and specificity are measures of test performance that are widely used in the modern scientific literature, especially in medical researches and diagnosis. The first documented use of these concepts in research goes back to more than one thousand years ago when Muslims set criteria for the verification of Hadith.

In this article, first the method of Hadith verification is briefly reviewed, followed by brief explanation of sensitivity and specificity, and lastly the use of the concept of sensitivity and specificity in Hadith verification method is examined.

Keywords: Hadith, mustalah ul hadith, verification, sensitivity, specificity.

Introduction
Hadith is defined as “any saying, action, tacit approval, description and manner attributed to the Prophet of Allah, peace be upon him (PBUH).” (1) Hadith is the second source of Islam after the Holy Qur’an, and comprises two parts: the matn (text), and the sanad (that is the chain of reporters that contains the names of all narrators reporting from one to the other, ending up to the Prophet PBUH).

Muslims have set criteria for accepting a report said to be related to the Prophet Mohammed, PBUH as a “Hadith”. These criteria are like a test that distinguishes a sound Hadith from the counterfeited one. In modern times test performance is usually measured by the statistical concepts of ‘sensitivity and specificity’. These terms have recently been widely used in medical researches. This article shows that the concepts of ‘sensitivity and specificity’ were effectively used for verification of the Hadith sanad (the chain of reporters), more than one thousand years ago.

Methodology
The most important reference book in the matter of verification of “Hadith” was written by Ibn Salah (died 643 H/1245): Muqaddimaht ibn Salah. (2) This reference book is well accepted by scholars of the Hadith and studies in detail the principles that

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determine the basis for accepting or rejecting a statement of a Hadith-narrator (sanad), and the integrity of the text (matn) of a Hadith. This book has been used by a number of Islamic scholars over the centuries, and several books are based on it.\(^3\)\(^-\)\(^6\) Muqaddimaht ibn Salah has been copied manually, printed several times, and translated to other languages. In this study this book was used to describe the verification process of Hadith.

Subsequently the concept of sensitivity and specificity is briefly introduced and finally the similarity of this concept to the sanad verification technique is discussed.

**Result and Disscusion**

There are several types of Ahadith (plural of Hadith) that are classified from different points of view. From the perspective of the number of reporters in each level, Ahadith are divided into two classes: Mutawatir (narrated simultaneously by numerous people at all the levels of the chain of the narrators) and Ahaad (narrated by a single individual or only few persons at each level in the chain of narrators). Thus, ‘Mutawatir’ is the report of a Hadith by a large number of narrators whose agreement upon counterfeit news is logically unimaginable and impossible. This condition must be met in the entire chain of reporters, and the narration must be based on the undoubted sound senses of the narrators. A report related to the Prophet PBUH conveyed by a Hadith of ‘Mutawatir status’ is therefore taken as a “statement conveyed with certainty”. Ahaad is the Hadith that does not have the strict criteria of the ‘Mutawatir status’ and therefore does not confer the same level of certainty to the statement.\(^7\)

*Mutawatir* status does not need further verification since it is accepted as knowledge with certitude. *Ahaad* status needs to be verified. The verification of the reliability and trustworthiness of each and every one of the chain of the narrators should be down to the point when the Hadith is recorded in one of the books compiled by the Hadith scholars. These written documentations have been copied/memorized by a large number of people during centuries, and are accepted as authenticated references of Hadith. Recent prints/ reprints of these books carry the same weight of authenticity if they are verified by scholars of Hadith to the time of publication. Therefore, a verified Hadith needs no for further verification.

Based on the orders of Allah, the Almighty, and the orders of his Last Messenger PBUH, the Companions (Sahaba) of the Prophet PBUH, were very careful to truthfully convey ‘any statement related to the religion of Islam’ before accepting it as a “true statement”. This would need even more care of exactness in transmission when the cited words or actions were related to the Prophet PBUH. In subsequent eras, scholars greatly elaborated on verification of verbal quotations conveyed to them. The methods of verification were conveyed from scholars to their students. Many Hadith books have been compiled during this period including the collections of Sahih Al Bukhari (d.256/870) and Sahih Muslim (d.261/875). Finally the science of Mustalah ul Hadith (knowledge of the principles that determine the status of the narrators and the text of Hadith) was developed, recorded and documented. The first manuscript of Mustalah ul Hadith was recorded by al-Rāmahurmuzī (4th/10th century) but later on, the more comprehensive and famous book in this field, Muqaddimaht Ibn Salah was written by Ibn al Salah (d.643/1245).\(^8\)

*Ahaad* Hadith is divided into several categories of authenticity. An *Ahaad* Hadith with a sound chain of narrators (sanad) and sound text (matn) is classified as Sahih (sound). The next best in authenticity is classified as Hasan (good/ fair) and the final class is Daeef (weak). The first two of these classes are acceptable. Definitions, criteria and subclasses of each of these categories are the subject of Mustalah ul Hadith.

Ibn al-Salah defines a Sahih (sound) Hadith as the one supported by a *sanad* (chain of narrators) which transmits the Hadith uninterruptedly through a chain of one trustworthy narrator, complete and precise in
memory citing another trustworthy person, complete and precise in memory up to the level of the Prophet PBUH. Such a Hadith should neither have “disparity with better accepted narrators “sh’azh” nor be defective “muallal”.

“Hasan (fair /good) Hadith is the one with a sanad containing a reporter who is known to be truthful and reliable, but is a degree less in his preservation/memory of Hadith in comparison to the reporters of Sahih Hadith”. (9)

Daeef (weak) Hadith, neither contains the criteria of Sahih nor that of Hasan Hadith. (12)

Since careful examination of the linkage, trustfulness and memory of all the reporters in the chain of narrators was needed, it was necessary to compile the biographies of narrators in great detail. The ethics of discussing and documenting remarks about members of the chain of narrators was discussed in detail, as some of those remarks may be disparaging. Eventually it was passed as “permissible to document authenticating or disparaging remarks made by recognized experts in order to ‘scrutinize the reporters of a Hadith’”. (13)

Both the text (matn) and the chain of transmission (sanad) have to be examined. If the text seems to be sound, its sanad still needs to be verified by experts. (14) The study of the text comprises ruling out any defects, contradictions with other stronger statements, or other obvious ambiguities. (15)

Experience shows that dichotomous tests that mankind used across history have led to four possible results, namely: true positive, true negative, false positive and false negative. Sensitivity is the proportion of true positive results correctly identified by the test and Specificity is the proportion of true negative results that are correctly identified by the test. Hence: Sensitivity = True positive / (True positive + False negative), and Specificity = True negative / (True negative + False positive).

Sensitivity and specificity are measures of test performance that apparently were first mentioned in current scientific literature, by Yerushalmy in 1947 (16,17) and have been used as the measures in evaluating the accuracy of diagnostic test. (18-20)

Dupuy and Simon say that sensitivity and specificity “are clinically more meaningful than global accuracy because they yield information on how the classifier behaves in each outcome category”. (21)

The best and ideal diagnostic test would have 100% sensitivity and 100% specificity, in which the possibility of false positive and false negative is nil. However due to the limited knowledge of human beings, designing of such a test is not always practically possible. Hence, usually based on the purpose of the test, either the high sensitive test that results in less false negatives with more false positives, or the high specific test that results in less false positives and more false negatives, is preferred and selected. Tests that have been used by experts of the discipline of Hadith (Ulum-al-Hadith) for verification of Hadith’s chain of transmission, may give one of the four above mentioned results. By looking at confirmation techniques in verification of Hadith’s chain of transmission (sanad), one can clearly notice that these techniques reduce the false positives and increase the possibility of false negatives. In other words, specificity is high while the sensitivity is low. That means that the concept of sensitivity and specificity was used in these techniques.

- What does “Sound Hadith” mean?: Ibn al-Salah wrote (22): When they say “This Hadith is Sahih (sound)” it means that its chain of transmission (sanad) is consistent (uninterrupted) up to the Prophet peace be upon him, by a series of trustworthy reporters. The term “sound Hadith” means that the criteria of sound Hadith are met, but does not mean absolute certainty. This is because there is still a probability of error of reporting by the person classified as ‘trustworthy’, although this probability is small and unlikely. (22-24)

The evidence of soundness of the Hadith is further substantiated if further screening of the chain of reporters transmitting the
Hadith is supported by evidences like unanimous agreement of experts of the ‘trustworthiness’ of all members of the chain of reporters in the ‘sanad’. This raises the level of authentic state to either “certainty” or “close to certainty”, depending on the degree of agreement between the reviewing experts examining each and every member of the chain of the ‘sanad’.\(^{(25-27)}\)

- What does “Weak Hadith” mean? It is a Hadith that is classified as ‘unsound’. This does NOT necessarily mean with certainty that the Hadith is a ‘not true’ or that ‘it has never been said by the Prophet PBUH. This is because of the possibility of verity in any person who makes mistakes cannot be excluded with certainty, however its sanad is not sound according to the above mentioned criteria; Allah knows best.\(^{(28-30)}\)

In the paragraph regarding the sound Hadith, the possibility of false positive, and in the paragraph regarding the weak Hadith, the possibility of false negative are indicated. Although Hadith scholars did not mention these terms, nor did they quantify qualities, but their method was designed in such a manner that they enhanced specificity (decreased false positive) and reduced the sensitivity (increased false negative). A decrease in false positive enhances the specificity (True negative / [True negative + False positive]) because it decreases the denominator. Kasule\(^{(15)}\) pointed to this issue: “In order to deal with false positive and false negative, criteria are set in such a way that it is easier to reject a true Hadith than accept a false one”.

It is known and proved by experience that sequential tests enhance the specificity and reduce the sensitivity.\(^{(31,32)}\) As shown above, the method used for verification of Hadith’s chain of transmission included several sequential tests which enhance the specificity. With regards to the aforementioned criteria, if the narrators’ chain is broken (i.e. one or more of the narrators in the chain are anonymous persons), or if one narrator does not match the criteria of trustworthiness or if one narrator is reported to be ‘not complete and precise in his memory’, the report will not be accepted as a sahih (sound) Hadith, although it is possible that the Hadith in question could have been truly related to the Prophet PBUH. Conversely the possibility of accepting false positives seems to be very scarce due to the strictness of the methodology and use of sequential tests used in the verification method.

Not all Hadiths that are sound from the point of view of its sanad (chain of reporters) are necessarily sound, since occasionally a Hadith that is sound from the perspective of its sanad, may not be sound from the viewpoint of matn (text).\(^{(33)}\) Therefore, even if the Hadith’s chain of transmission is verified, its matn (text) has to be screened in order to rule out any defect, and to verify that the text is not contradicting with the Holy Qur’an or with other Hadiths with stronger narrators-chain (sanad). This condition will exclude Hadith with any problems in the text.\(^{(15)}\)

One should not misunderstand that all the ahadith (plural of Hadith) have been completely collected based on probabilities, Hadith Mutawatir (narrated simultaneously by numerous people) conveys knowledge or instructions from Allah the Almighty, through his Messenger PBUH , with certainty as does the Holy Qur’an. But Scholars differ about the authenticity of Ahaad Hadith with sound sanad. Some say that Ahaad Hadith with sound sanad conveys messages from the Prophet PBUH, that are very close to certainty; while according to others, Ahaad Hadith with sound sanad conveys knowledge with certainty only if the soundness is supported by other evidences; for example if it is agreed upon unanimously by experts.\(^{(25-27, 30,34,35)}\)

In conclusion, information about Hadith, its verification method, and the statistical concepts of sensitivity/ specificity is already available elsewhere, but this article adds: The first documented and known use of the concepts of specificity and sensitivity (albeit without mentioning the modern statistical terminology), goes back to more than one thousand years ago when Muslims set criteria.
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References
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29. Al-Tahan. p.46-47
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