Reviewer A
For author and editor Subject: General upper bounds for well-behaving goodness measures on dependency rules General contribution: The paper contains formal considerations of mathematical properties of rule interestingness measures. Generally speaking, evaluation of rules is a quite difficult topic in KDD as mainly association analysis algorithms have the potential ability to generate too large number of rule patterns. Having good evaluation measures could help users in filtering such rules and focusing attention on the smaller set of rules. Up to now many different "objective" measure have been introduced. Each of them should reflect certain characteristic of local patterns and should lead to better understanding of their different aspects. However, while choosing among these measures it is reasonable to check the user's expectation towards the behaviour of the measures in several possible, particular situations in data. This way more mathematical analysis of such properties is undertaken by various researches and its results should be helpful with respect to the above motivations in more practical points of association rule discovery. The author of the reviewed paper refers to the older idea (from Piatetsky Shapiro well known paper) of axioms defining so called goodness measure M. The author formalizes in another way these previously known axioms and slightly extended them to cover also so called negative dependency rules. The most interesting part of this strictly theoretical analysis is the second part of chapter 4 in particular Theorem 4.1 concerning the upper bounds which should hold for measure fulfilling the above axioms. The more practical consequence of these very formal considerations - they could be used to prune more specialized rules knowing M measures for their general form. In addition, the author presents very long proofs showing that chi2 measure, two versions of z-scores and J-measure fulfil the new axioms - some of them both for positive an negative dependencies. The paper is written as a typical mathematical one focussing on theoretical aspects (which is somehow consistent with the journal as FI). However, I am afraid that it is readable mainly for researchers deeply involved in theoretical aspects of rule attractiveness measures. The way how the paper is organized and written makes it rather unclear for typical KDD researchers -- see also my critical remarks. 

Major doubts
The general doubts concerns the significance of the paper contribution to the field of KDD. 1. The authors focuses on extending quite well known but also first (old set of axioms as to M- it is a kind of monotonic property with respect to objects supporting or not supporting the syntax of the rules. However, since the early 90's there have been more research on such properties - see e.g. Yao, Zhong: An analysis of quantitative measures associated with rules. Proc. 3rd PAKDD. Hilderman R., Hamiliton H. Knowledge Discovery and Measures of Interest. Kluwer book, 2002 Greco S, Slowinski R and Szczech I: Analysis of monotonicity properties of some rule interestingness measures. Proc. KNTPD, 2007. and more recent by some Italian researchers. You can also check a nice review in Tan, Steinbach, Kumar: Introduction to Data Mining, 2005 - chapter 6.7 or another shorter review in Maimon, Rokach (eds.) The Data Mining and Knowledge Discovery Handbook - published by Springer few years ago. The point is that other researchers also extended in different way M monotonic axioms- however they also demanded to consider new important properties as the properties of confirmation quantifying the degree to which the premise of the rule provides evidence for or against the conclusion -- see various version of Bayesian confirmation of the rule. Other properties also include (see Tan's review) symmetry, inversion, null additions or scaling. Moreover, I would mention the more recent work on at least two criteria evaluation of rule measures (i.e. saying that focusing on on type of goodness measures is not enough to filter association rules - see older work of Bayardo and Agrawal: Mining the
most interesting rules or newer - more multicriteria one: Brzezinska et al. Mining Pareto-optimal rules with respect to support and anti-support. Eng. Appli of AI (?2008). Knowing this context of related works, I wonder how general and useful are results from the reviewed paper. My impression from reading - although good mathematical proofs I am afraid they are not so sound for KDD. Could the author:- explain motivations of staying with M axioms only,- add related works discussion on the above other ways of defining properties and axioms,- convince that reader that more rule evaluation measures could fulfil their axioms and upper bounds, (e.g. what about anti-support, different extensions of Piatetsky's RI, dependency factors, confirmation measures f and s, LN, LS ?) - current proof are too much restricted to simple statistical based measures. - put her consideration more precisely in the context of current (and more practical) research on rule discovery.2. Another critical remarks - I have impression that the contribution of Theorem 4.1 concerns rather negative dependency. We could say that in KDD users are usually focused on rules reflecting positive dependency in data - please add short discussion on this point. Minor remarks. Knowing KDD and ML literature I would suggest to rethink some terminology and phrases- page 2 notation - N are definitely frequencies in databases - calling them random variables makes unnecessary impression of probabilities and realization of some general variables in population.- notation XA is rather X \and A?- saying about enumeration and optimization is rather strange for somebody knowing algorithms for rule induction(first term concern algorithm generating all rules fulfilling some requirements - as classical association rules, while the other is just filtering or selecting - calling it optimal decision with respect to some criteria is controversial.- the name "statistical dependency rule" is also slightly controversial- while explaining goodness measures I would add comment on the assumption on binary attributes - it comes from the contingency table while originally a rule condition may represent more general attributes in database (e.g. numerical ones).

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Reviewer B
I find the paper as very interesting and I believe it will be eventually accepted to Fundamenta Informaticae. However, I have several comments: 1. The structure of the paper needs to be reorganized. Some measures in the Appendix, e.g. chi-square and mutual information, seem to be known to have the considered properties. Furthermore, I'd rather include the content of Appendix in the major text, as the considered measures may be good illustrations (case studies, examples) that help a reader to understand the general results. Also, some simple examples of data sets and specific behavior of the considered measures would be very helpful. 2. Literature should be extended. 3. I'd be very interested in the Author's opinion on whether the presented results could be generalized onto the measures for dependencies between the sets of attributes, such as those studied e.g. in: http://www.informatik.uni-trier.de/~ley/db/journals/fuin/fuin44.htmlSlezak00http://www.informatik.uni-trier.de/~ley/db/journals/fuin/fuin53.htmlVlezak02 However, I do not know how to generalize the leverage and other details in a reasonable way. 4. Grammar and style need to be improved. I found a number of mistakes. Those most frequently occurring are related to: -- Wrongly used commas-- Wrong usage of "hold" in front of equations (try to write in this way: "the following equations hold:" etc)-- Mixed usage of tenses-- Some words that I'm not sure about (e.g.: "legal" or "valid")-- Repetitions (e.g.: the usage of "For example" and "e.g." in the same sentence)

There
are also some other simple mistakes - the paper needs to be carefully proof-read. Also, I'd like to suggest introducing some abbreviated notation for "A=a" and "P(A=a)", as it occurs very frequently and makes the equations hard to read. Figures should be located at the pages immediately after their first reference. So, it would be nice to have Fig. 1 and 2 grouped on page 7, followed by Fig. 3 and 4, as well as 5 and 6.5. I do not understand some explanations. For example, I'm not sure whether the Author writes about independence or conditional independence.