Changes for Submission 1 to SI:EXPRESS/SOS'18

Unique Solutions of Contractions, CCS, and their HOL Formalisation

We would like to thank the reviewers for many useful comments and suggestions. We believe we have taken all of them into consideration, as best as we could.

The main addition, here again following the recommendations of the reviewers has been the extension of the our central theorems to the multivariable case (ie., moving from "unique solution theorems" for a single equations, or contractions, to multi-equations or multi-contractions). This has been a significant effort (also because a few alternative ways to make the extension had to be examined). At the end, this work consists of another 4,000 lines of proof scripts and a whole new Section 5 in the paper.

In the following, we discuss the changes to the paper and provide a point-by-point reply to the issues that have been raised.

Our answers are marked with a " R: " at the beginning.

Best regards,

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Responses to Review 1 (accept - minor revision)

Meta comments

1. This paper describes a HOL formalisation of several notions in process theory: CCS and various kinds of bisimilarity, and in particular the unique-solutions technique. The latter was introduced by Milner, and recently revisited and refined by the second author.
2. In general, these kinds of results are error-prone, especially those related to weak bisimilarity: there are multiple known mistakes in the literature. Therefore, formalisation is a worthwile effort. Moreover, the formalisation itself is quite readable. The paper itself documents this formalisation and is, for the most part, clear.
3. The paper is an extended version of an EXPRESS/SOS paper. The extension consists of a more detailed report of the proofs - perhaps this is enough.
4. I was disappointed though that multi-variable contexts are still not treated (I reviewed the EXPRESS/SOS paper as well and complained about that then). This means the current formalisation does *not* fully formalise the unique-solution method. The journal version would have been ideal to solve this issue. It is briefly discussed in the conclusion, but in fact, the first author's master thesis argues that it is possible: "With these new devices, it's possible to formalize all "unique solution of equations" theorems with multi-variable equations, without touching existing formalization framework.". The current discussion should at the very least explain this (is the master thesis wrong? is this too hard, or too much work?), but hopefully it can just be done properly so that the paper fully covers the correctness of the unique-solution method.

R: As indicated above, we have make the extension to the multivariate (i.e. multi-variable) versions of two core theorems: the *unique solution of rooted contractions theorem* (Theorem 3.16) and *Milner's strong unique-solution theorem* (Prop. 4.14 (2) of [1, p. 103]), and added a whole new section to discuss the main issues faced in the extension (having to do, eg, with multivariable contexts, weakly-guarded equations and multivariable substitutions). The extension is indeed based on the existing framework in the sense that, we do not change the CCS datatype definition and the SOS rules

5. overall the paper can use a bit of spell-checking and proofreading (e.g. there are some initials in the margin)

Detailed comments

1. L45: "about unique solution*s*"
   R: Fixed.
2. L84 "the weak one" rephrase
   R:
   Done.
3. L91 "bisimiarity"
   R: Fixed.
4. proof of thm 3.10: could there be some kind of picture to help? also, the "Hence," in the one-to-last line refers only to the property right before it, right? (about $C[\widetilde{Q}]$)
   R: We have rephrased this proof (also the theorem statements) with a picture (Fig. 2 illustrating the proof.
5. L209: "their precongruences" precongruence closure?
   R: Rephrased.
6. L216 "using Lemma 3.13 ... Section 4.9" perhaps just repeat the lemma before the theorem, as it's a bit hard to read Lemma 4.14 at this stage
   R: We have recalled Lemma 3.13 of [1] as Lemma 3.15 right before Theorem 3.13, which now becomes Theorem 3.16).
7. L224: full stop and new sentence after "1972"
   R: Done.
8. L227 "considerable" -> "considerably"
   R: Done.
9. L228 "formal theories built in HOL is easily convincible" questionable grammar
   R: We have rephrased the sentence.
10. L238 how is this without loss of generality?
    R: Sentence eliminated as now we have formalized the multivariate version of the unique-solution theorems. The "without loss of generality" intended to point out that all steps of informal proofs do appear in the univariate formal proofs. The additional difficulities for the formal multivariate proof are discussed in Section 5.
11. L245 maybe more clear to just give the definition of β Action
    R: The original HOL definition of the type Action is now given.
12. L250,300: perhaps explain what these (double) backquotes signify or just remove the sentence
    R: Sentences removed. In HOL, single and double backquotes are delimitator between "inner" (logic) and "outer" (proof) languages but this is not really relevant for the present paper. After new HOL releases (k13) most uses of backquotes in definitions can be eliminated.
13. L277 "substutiion"
    R: Fixed.
14. L280 (around): put some of these equalities on a single line? enough space
    R: Now we have removed most less-interesting cases and explained in details the two interesting cases (recursion operator and (free) variables).
15. L316 and later, e.g. 323: is "p" a closed ccs term?
    R: Yes, we have further explained this.
16. L361 "Many lemmas ... contexts" this is a bit vague
    R: We have rephrased
17. L374 "An highlight"
    R: Fixed.

18. L378 "is a" => "are"
R: Fixed.
19. L385 "With *the* above"
R: Fixed.
20. L386 "the definition" of what? (bisimilarity, but say that)
R: Fixed ("the definition of (strong) bisimilarity").
21. L394 "since *the* Kananaskis-11 release"
R: Fixed.
22. L396 "we call *the* Hol_coreln"
R: Fixed.
23. L410 E and E' missing
R: All formal theorems and definitions are generated from HOL4. By default, all theorems are fully specialised, removing outermost universal quantifiers. For certain important theorems like this one, now we have disabled the specialization showing outermost universal quantifiers.
24. L436 "is defined upon weak transition" grammar
R: We have rephrased: "The definition of weak bisimulation is based on weak and ϵ–transitions:"
25. L505 this is good: it is missing for strong bisimilarity, should be added there too (the two definitions are now not explicitly related)
R: We have removed the duplicated part and only kept the part for weak bisimulation.
26. L580 "a contraction" ?
R: We have rephrased this
27. section 4.6 header: "the formalisation of bisimulation up to bisimilarity", i would say; also since you're not using compatible/respectful functions
R: Fixed.
28. L599 PRQ not so pretty spacing. perhaps mention around here that naive weak bisimulation up to weak bisimilarity is unsound?
R: Fixed (we mention that the "naive weak bisimulation up to weak bisimilarity is unsound" right before the definition of "weak bisimilation up to.")
29. L655 (around here): i'd say in the text above it that this is a different bisimulation game, not a different up-to technique
R: Thanks. We have rephrased it
30. L708 " closure of bisimilarity under such operator" not sure whether this is gramatically correct
R: Rephrased
31. figure 2: I'm a bit confused since the other implication is missing.
R: We fixed one minor issue in Fig. 2 (from `SUM_EQUIV` to $\approx^c$ the label $\subseteq$ should be $\supseteq$). The main message of Fig. 2 is to show the equivalences of three involved relations by making a loop of implications.
32. Overall, in section 4.7, it seems the claim in the beginning is only proved under certain hypotheses: the "free-action" property, or in the Glabbeek proof, finite processes. This is all very much hidden: and it should be said up-front what we are going to prove exactly under which assumptions.
R: We have rephrased the beginning part, putting the free-action hypothesis as early as possible.
33. L740 "this proof" which?
R: "this proof (Theorem 4.11 in next section)".
34. The beginning of section 4.8 is really confusing: what are "the two root processes"? What are we going to prove in this section, and why, what is the aim here? Again, under which assumptions are we going to work?
R: We have re-organized this section, putting the target theorem and its limitations first.
35. L820 "bisimularity"
R: Fixed.

36. Lemma 4.14 is nicely introduced, Thm 4.15 not.
R: We have add some explanation on the proof details of Thm 4.15.
37. L898 full stop & new sentence after "many ways"
R: Fixed.
38. L990-995 aren't some of the textbook proofs even wrong? (e.g. [2] in the proof for unique solutions makes use of weak bisimulation up to weak bisimilarity, if i remember correctly) - one could perhaps say this, it makes the point even stronger
R: Thanks for reminding this. We have added this argument into the conclusion.

Responses to Review 2 (accept - minor revision)

Meta comments

1. This paper presents a formalisation in HOL of the core classical theory of CCS, with a particular focus on unique (modulo a proper equivalence) solutions of equations, and of the more recent theory of contractions developed by one of the authors.
2. The focus is on weak semantics, which is well-known to be quite delicate, which makes the results of the paper relevant and interesting.
3. Notably, the HOL formalisation has allowed the authors to refine the theory of unique solutions of contractions. In detail, the authors rely on rooted contractions and prove that a system of weakly guarded contractions has a unique solution modulo rooted weak bisimilarity. Interestingly, no constraint on occurrences of summations is required.

   I found this work elegant and interesting, I propose acceptance with minor review.

Detailed comments

1. There are some typos. E.g., several times I read "bisimiarity" (the "l" is missed).
R: Fixed
2. There are side remarks that should be removed.
R: Done.
3. The two sentences immediately before and after Example 3.7 are equivalent.
R: We have removed the one before Example 3.7.
4. The notion of "substitutivity property" should be introduced, now it's used but not explained.
R: We have rephrased it as "precongruence property" which is indeed introduced and further explained in Section 4.
5. I strongly believe that Section 4 is accessible only to people already familiar with HOL syntax. I suggest the authors to give some more details. Some examples.
R: We have added some HOL background and links to further details about its official documentation.
6. You assume the reader knows what Hol_reln is, but this not always the case. Then, you define the congruence in terms of the equivalence, but is the equivalence already defined somewhere?
R: We have further explained what `Hol_reln` does and returns.
7. The argument at lines 387-389 is clear only after the lines 394-427 have been read.
R: We have merged the strong and weak cases.
8. At lines 577 you write that proving properties for contraction is in general harder than proving properties for expansion. Could you explain why?
R: We added some explanations, including this sentence: "this is mostly due to the (surprising) fact that, contraction does not imply weak bisimulation (while expansion indeed implies weak bisimulation) ".

Responses to Review 3 (accept - major revision)

Meta comments

1. This paper presents a HOL formalisation of part of the theory of CCS. It formalises the syntax and operational semantics of CCS, strong and weak bisimilarity, and several well-known auxiliary techniques for establishing that CCS processes are bisimilar.
2. The most notable contribution seems to be the formalisation (and modest extension) of results already obtained by the second author in an ACM TOCL paper (ref. [7]) pertaining regarding the uniqueness of solutions of contractions. The main addition with respect to the EXPRESS/SOS 2018 publication of the authors with the same title (ref. [1]), seems to be a HOL formalisation of the proof that rooted weak bisimilarity is the coarsest congruence contained in weak bisimilarity, and that rooted contraction is the coarsest precongruence contained in contraction. The HOL proof scripts are publicly available through a GitHub repository.
3. The scientific contribution of the paper is, in my opinion, modest, at least in its current form. With the exception of the extension of the results in [7] to rooted contractions, the paper seems to merely consist of reformulations in HOL of well-known definitions and theorems with, here and there, some superficial comments about the proof scripts needed to prove the results (e.g., the coinduction package available for HOL simplifies the formalisation).
4. Putting it bluntly, the current message of the paper seems to be that there are HOL proof scripts available in a GitHub repository. Perhaps there is something interesting and general to learn from this particular HOL formalisation, either about HOL or about CCS, but then this should be explained in much more detail.
5. It does not help that the paper has many typos and ungrammatical sentences. Also, the article explains too little about HOL for a reader without prior exposure to HOL to fully appreciate the contents of Section 4 and, in particular, understand the meta-remarks about the formalisation.
6. I do find it very useful that the theory of CCS is formalised in HOL, so that others can benefit from it when doing computer-assisted proofs of results pertaining to CCS, or about CCS processes. I think this is important work, and researchers should get due credit for this. Currently, the value is really in the availability of the HOL proof scripts, and not so much in the article they wrote about it.
7. In conclusion, on the positive side, I think the authors did some important work formalising part of the theory of CCS in HOL, and on the negative side I have doubts about the scientific value of the article they wrote about it. I am therefore reluctant to support publication in Information and Computation at this stage.
8. I am therefore reluctant to support publication in Information and Computation at this stage. I suggest to ask the authors for a major revision in which they make the paper accessible for readers not familiar with HOL, comment in more detail on the HOL proof scripts and what can be learned from them, and take into account the detailed comments below.

Line-based comments

1. Abstract: There should be a remark that this is about weak bisimilarity. In general 'bisimilarity' is strong bisimilarity.

   R: We have added "(weak)" before "bisimilarity", in the first line of abstract.
2. L18: Remove the word 'rather'

   R: Done.
3. L28: Hennessy Lemma -> Hennessy's Lemma

   R: Done.

4. L28: Deng Lemma -> Deng's lemma
   R: Done.
5. L28: Remove the word 'long'
   R: Done.
6. L28: proofs -> theorems
   R: Done.
7. L32: Add the word 'also' after 'the work is'
   R: Done.
8. L34: From the view of -> From the point of view of
   R: Done.
9. L35: Regarding the sentence "as formally proving a previously known result gives us the chance to see what is really needed for establishing that result." Either omit this sentence or explain what technical insights one gains by doing this work
   R: Our formal proof of the standard result "$\approx^c$ is the coarsest congruence contained in $\approx$" is one such example, where the formal theorem we obtained has slightly weaker antecedents under the same proof idea. We have however now omitted the sentence.
10. L43-48: This sentence is difficult to read and could be split into multiple sentences.
    R: We have rephrased it into multiple sentences.
11. L55-60: Remove "Given a deadlock 0"
    R: Done.
12. L58: the trailing 0 -> a trailing 0
    R: Done.
13. L59: "shown in Fig. 1" is placed after "a Labeled Transition System", causing the belief that Figure 1 contains an LTS. But there is no LTS. Figure 1 contains the SOS of CCS.
    R: We have rephrased it (pointing out that Fig.1 represents an LTS expressed in SOS rules).
14. Semantics: The relabeling rule is not explained anywhere.
    R: In this project, relabeling is not discussed besides their presense in CCS syntax. In particular, relabeling doesn't bring in any delicate issues in the proofs of unique-solution theorems. We have clarified this right before the CCS datatype definition.
15. Semantics: The constraint on the relabeling functions does not belong to the inference rule, but should be formulated as a restriction on the syntax.
    R: We have moved the side condition to the main text where we explain the syntax.
16. L74: Add the word 'a' between 'are' and 'context'.
    R: Done.
17. Contexts: Does an i-holed context have exactly one hole $[]_i$ for each i? This question is not answered anywhere in the text.

    In the formalisation you only use contexts with one kind of hole []. This definition can be changed to only use one hole as well, with a clear indication that this hole can occur multiple times.

    R: We have completely rewritten this part, now we adopt free variables and unified CCS expressions for both processes and equations. We have then explained the meaning of context in relation to this (having multiequations now we have to deal also with contexts with multiple holes)
18. L82: Remove the comma after Q'
    R: Done.
19. Definition 2.2: Superscript c is already used for contextual closure. Does $\approx^c$ stand for the contextual closure of $\approx$, or is it something else? Since contextual closure is not used anywhere in the paper, it is best to remove it. Otherwise you need different notation for rooted bisimilarity.
    R: We have removed the definition of "context closure" since it's not (explicitly) used in the paper. Then $\approx^c$ is a standard notation for rooted bisimilarity (eg Gorrieri [2])

20. L91: What does 'reducing' mean?
R: We have rephrased the sentence.
21. L91: bisimiarity -> bisimilarity
R: Fixed.
22. L92: bisimiarity -> bisimilarity
R: Fixed.
23. L92: Add a colon after 'results'
R: We have rephrased texts around here, the original sentence has disappeared.
24. L118: Why is the word 'actions' in bold font? It says 'ds' in the margin, what does that mean?
R: We have corrected it.
25. Definition 3.3: The definition of 'sequential' is awkward. Moreover this definition calls for some examples since the definitions can be very confusing.
R: We have added some examples, and used Milner's original definition of sequentiality.
26. Theorem 3.4: What are direct sums?
R: Rephrased: "with guarded sums only". We have removed all usages of "direct sum".
27. L.127: I think it would be clearer to give two concrete solutions rather than saying that any process not using a is a solution.
R: Done. (Two examples are $\mathbf{0}$ and $b.\mathbf{0}$.)
28. L138: "Bisimilarity contraction ... some contraction R". This is not a grammatically correct sentence.
R: We have rephrased the sentence.
29. L142: ".. are even required". The word 'even' suggests that this is a stronger requirement, but it is in fact weaker.
R: We have replaced it with "indeed".
30. L143: Add the words "that is" after 'preorder'.
R: Done.
31. L144: remove 'that'
R: Done.
32. L153: "As bisimilarity .. but sums." This is not a grammatically correct sentence.
R: We have removed the sentence, including this statement with the statement after the example.
33. Example 3.7: this example shows strictness of the inclusion. But the sentence before the example suggests that this is going to show that the preorder is not preserved by sums.
R: Having removed the sentence above now this should be ok. We have also rephrased the sentence following the Example 3.7.
34. L157: Doesn't this statement deserve a proof?
R: We have added a reference which contains this proof. Additionally, this proof will be discussed later in a formalized version.
35. L163: $P >= E[P]$ is spelled out earlier in Definition 3.2. Maybe spell out this one as well.
R: Done.
36. L165: If you define the notion of guardedness in Definition 3.3 on expressions first, and only thereafter extend it to systems of equations, then you could here simply reuse the definition on expressions to get a definition of the notion for systems of contractions. The advantage is that you are precise rather than suggestive.
R: We have merged these definitions as best as we could
37. L169: "The number of strong steps of which is is composed". Note that there is not a unique sequence; in fact, there may be many ways to reach R from $C[\widetilde{P}]$ with a weak μ-trace.
R: We have replaced "the transition" with "a transition".
38. L176: What does "applying the definition of $>=_{bis}$" mean? Footnote: Why not just spell out this definition instead of making a remark about it? It would make the conclusion of the proof somewhat easier to digest. If you decide to keep the footnote, change $\widetilde{R}$ to R'. The notation $\widetilde{R}$ is used for tuples.

39. L181: vis ?
R: Corrected.
40. L184: closes -> completes
R: Done.
41. L194: 'the definition should not be recursive'?
R: We meant the definition should not be *coinductive*, just like the case of $\approx^c$. Notice that, this is just an informal idea when searching for a possible definiton of rooted contraction, and the definition we found at last is indeed not coinductive
42. Definition 3.11: Similar to the remark about Definition 2.2.
R: We have tried to clarify this.
43. Proof of Theorem 3.14: Why do you use context C instead of tuples of expressions $\widetilde{E}$? If this is the case because you only use contexts with one kind of hole, then you should use the letter E instead of C. If $\widetilde{P}$ is a solution then $P_i >=^c E_i[\widetilde{P}]$ for all i, but this quantification over i is missing.
R: We have re-worked this proof.
44. L215: The prove -> The proof
R: Fixed during re-work of the proof of Theorem 3.14.
45. General: the word 'Logic' in "HOL Logic" is redundant.
R: Removed "Logic" from "HOL Logic".
46. L223-225: Perhaps you want to reformulate this long sentence. It is hard to read.
R: The long sentence is spilited.
47. L227: considerable -> considerably
R: Done.
48. L228: is -> are
R: Done.
49. L228: what does convincible mean here?
R: We have further explained it.
50. L230: single?
R: Changed to: "the *same* (programming language)"
51. L235: The sentence between parentheses is an important remark and should not be between parentheses.
R: Removed parentheses.
52. L238: without loss of generality?
R: We have eliminated this sentence as now we have the multivariate formalizations.
53. L239: similar to the comment about line 118, theorem-prover is bold and 'ds' is in the margin.
R: We have eliminated this sentence as now we have the multivariate formalizations.
54. L245: now based on HOL's option theory?
R: `option` is the name of the HOL formal theory. (Then we have removed this mention completely)
55. L249: What are 'backquotes'?
R: We have eliminated most uses of backquotes using HOL's new syntax.
56. Footnote 3: What are CCS literals?
R: Corrected.
57. L265: What does the turnstile mean? I would expect that structural operational rules are axioms of the theory, but the turnstile suggests to me that they are theorems.
R: We have tried to clarify this. (SOS rules are not axioms, because it's generally not allowed to define new axioms. SOS rules are actually theorems added by the inductive relation `TRANS` as a conservative extension of the logic.)
58. L275: we substitute rec A. P for all occurrences of the variable A in P.
R: Done.

59. L279: substutiion -> substitution
R: Fixed.
60. L289: these -> the, on the tenary -> of the ternary
R: Fixed.
61. General: in the lines 293-300 the trailing deadlock 0 is given, while in the preliminaries you stated that it would be omitted. If you decide to keep the deadlock, it should also be in bold font.
R: We have made them all in bold fonts.
62. L296: I don't understand fact (1).
R: We have re-phrased this part: "(1) there exist indeed three transitions mentioned above; (2) there exists no other transition."
63. L299: 'Hence ... CCS_TRANS_CONV' is not a grammatically correct sentence; there is a verb missing.
R: We have rephrased this sentence.
64. L316: Explain what is p.
R: We have explained it in the paper. In this case there is no hole in the context.
65. Footnote 4: Do you mean 'unguarded recursion'? How can relabelling operators cause infinite branching?
R: We have removed the part "due to the use of ...".
66. L362: tedious but long -> tedious and long
R: Done.
67. L374: An highlight -> A highlight
R: Rephrased to "One highlight..."
68. L378: relations on CCS process -> relation on CCS processes
R: Done.
69. Footnote 5: Add the word 'respectively' between 'quantifiers' and 'in'.
R: Done.
70. Footnote 6: Regarding the last sentence between parentheses. What do you mean by this?
R: By default, all theorems (their TEXcode) exported from HOL are fully specialised, removing outermost universal quantifiers. We have moved this sentence to Section 4.2 between parentheses.
71. General: The same trick of applying the coinduction package to the definition of bisimulation is repeated twice.
R: We have removed the one for strong bisimulation, leaving only the part for weak bisimulation.
72. General: In the sections about the HOL formalisation you refer to weak bisimulation instead of bisimulation.
R: In the first part of the paper, strong bisimulation rarely appears as the focus is on weak bisimulation. But in the formalisation sections we also formalised Milner's unique-solution theorem for strong bisimilarity and many statements must distinguish between strong/weak bisimilarities. Thus we often use "weak bisimulation" to make it clearer.
73. L461: I think there is no need to include those 3 theorems. Wouldn't it suffice to write that similar theorems are returned as for `STRONG_EQUIV`?
R: As pointed out above, we have only maintained the part for weak bisimulation.
74. L496-503: A similar remark can be made for `STRONG_EQUIV`. Why do you put it here?
R: Same as above.
75. L523,524: Similar to the comment about line L28
R: Done.
76. L545: What does this statement mean?
R: We have rephrased this sentence. (Basically we meant that any algebraic law for strong bisimilarity can be stated also for weak and rooted bisimilarity.)

77. Up-to techniques: You mention four up-to techniques for weak bisimilarity and each of them are not powerful enough to prove the unique solution theorems. Why are they not powerful enough?

R: We have repharsed this part.

78. L580: 'Surprisingly' To me this is not really surprising. Why do you find it surprising?

R: We have rephrased this sentence:

79. L606-619: I really see no added value in repeating Def. 4.2 in HOL syntax.

R: We have removed the HOL version.

80. Def. 4.4: Shouldn't there be double arrows? (twice)

R: Yes. We have fixed the definition.

81. L700: This paragraph starts with a sentence in parentheses, which is not very desirable. Moreover this sentence does not seem to be connected to the next sentence.

R: We have rephrased the sentence.

82. L701: Sentence does not end with a period.

R: We have added a colon at the end.

83. L704: What do you mean by "which itself may not be"?

R: We have rephrased the sentence: "(which needs not to be itself a (pre)congruence)".

84. Figure 2: The $\subseteq$ from `SUM_EQUIV` to Rooted bisimilarity makes the figure confusing; put a $\supseteq$

R: Done.

85. L723: is -> in

R: Done.

86. L723-L727: This sentence should be split into multiple sentences.

R: We have rephrased the sentence.

87. L744-745: pure mathematics?

R: We have removed this sentence.

88. L746: Arbitrary -> Arbitrarily

R: Done.

89. L749: "infinite such sub-processes" this construction does not seem right and could be avoided.

R: We have rephrased the sentence:

90. L754: non-τ action a -> $a \neq \tau$

R: Fixed.

91. L766: "By induction on the definition", don't you mean by induction on natural numbers?

R: We have rephrased the sentence: "Following the inductive structure of the definition of Klop processes,..."

92. L823: are -> is

R: Done.

93. L831: 'In above proof' Which proof are your referring too? I only see a theorem.

R: Fixed as: "In the proof of the above theorem".

94. L837: Add the word 'a' between 'not' and 'congruence'

R: Done.

95. L837: why do you also need the condition of sequentiality?

R: We have added an example to show its need.

96. L991: error-prune -> error-prone, 'since one is tempted to overlook details'?

R: We have rephrased the sentence.

97. L1001: the trace equivalences -> trace-based equivalences

R: Done.

98. L1006: in alphabetic order

R: Done.

99. L1040: hol4 -> HOL4

R: Fixed bibtex item.