Dear Editor,

We thank you for your comments on v2 of the manuscript and we provide in v3 changes according to your suggestions. We hope this v3 of the manuscript would have been improved enough for acceptance for publication in PCI animal science.

Please find below the detailed answers: in black comments from the reviewers, in red your comments and in green our responses. Also attached the v3, in which all changes have been put into blue text.

All the best,
Avelyne Villain and Céline Tallet, corresponding authors.

Reviewer: From Table 4, I'm understanding that you transformed some variables (like using log or sqrt). Please, consider adding this information also in the text when you write about symmetrical distribution L 206.

Authors v2: Yes, see line 245: " linear transformations were computed when necessary to reach symmetrical distribution (see tables 2, 3, 4)."
Editor: It would be good to specify what (linear) transformations exactly were used
Authors v3: It was added in the tables see table 2 and 3 (it was already in table 4), lines 247 & 248.

Reviewer: Was the vocalisation when conspecifics were social partners (line 141) used at all? I may have missed where that is presented. And if not, why was this included? And if used, how did you separate the vocalisation of the different pigs?
Authors v2: Vocalisations in relation to conspecifics arrival and the experimental design of the conditioning is already published 1. The reason why the two-way conditioning is explained in the method (with the human as the outcome and with the penmates as the outcome) is to be perfectly transparent on the full experiment and the different (pseudo)social experiences the experimental pigs were subjected to. The present article complete the preceding one on the same design, focusing on human-pig relationship.
Indeed, for ethical purposes, to limit the number of animals bred for experimental purposes, one experiment was designed with two (compatible) objectives. 1) Study the vocal and behavioural anticipation of (pseudo)social partners [using data of the conditioning before the reunion occurred, see Villain et al 2020, scientific reports]. 2) Study vocal and behavioural evolution of human-pig interactions [using data that were not explored in study 1]
See paragraph in the revised version of the manuscript Line 172: "Sessions of reunions with social partners were not studied and only served as reward during the conditioning in a previous analysis of vocal expression of positive anticipation (Villain et al. 2020).
Editor: the above sentence is not clear to me. It seems that you did study the sessions with social partners but not in this paper. I suggest : "Sessions of reunions with social partners are not studied here because they were part of an analysis on vocal expression of positive anticipation reported earlier (Villain et al. 2020)'
Authors v3: the sentence was replaced by your suggestion, see line 171 "Sessions of reunions with social partners were not studied here because they were part of an analysis on vocal expression of positive anticipation reported earlier "
.

Authors v2: Paragraph of the discussion has been rephrased:
“This test also showed that the conditioning modified the behaviour of non handled piglets so that they finally expressed a similar attraction toward the human as positively handled piglets, after the conditioning.
Editor: consider rephrasing as ‘so that after the conditioning, they expressed a similar attraction toward the human as positively handled piglets’
Authors v3: two ideas here. 1) the conditioning increase the behavioural proximity for all piglet (fig. 2) and 2) H piglets express a similar proximity as H+ piglets after the conditioning. We thus suggest this sentence now Line 489: “ Second, this test showed that the conditioning increased the behavioural proximity toward the human of both positively handled and non handled piglets so that non handled piglets expressed a similar attraction toward the human as positively handled piglets”

Authors v2: “We may be able to hypothesize a sequential establishment of a positive HAR over time: firstly with a decrease of attentive state and an increase in proximity and accepted contacts, and secondly with a disinterest of human contacts and the expression of natural foraging behaviour. The latter may require a higher exposure time.” Line 573
Editor: consider replacing ‘we may be able to hypothesize’ by ‘we hypothesize’
Authors v3: it was replaced, see line 521.

Authors v2: Table 1: “The number of times the piglet looked at other parts of the room” - as the pig will be looking somewhere at all times, this will always be within 1 of the previous variable (Nb looks toward human).
This code was to distinguish when the pig has the head down from when the pig has the head up but not watching the human (watching doors or walls). The description was changed to “The number of times the piglet looked at other parts of the room than the human or the floor (walls, doors)” Line 205.
Editor: could you simply say ‘The number of times the piglet looked at walls or doors’?
Authors v3: yes, we changed the text accordingly, see table 1 line 192 and table 2 line 247.

Reviewer: Table 2 and elsewhere: You use the word ‘parameter’ when ‘variable’ is the correct term.
Authors v3: In practice, parameters were used to build composite scores, used as response variables in statistical model. So, we tried to be consistent using the term “parameters” for specific measures (a behaviour or an acoustic parameter), the term “score” to refer to the PCs and the term “variable” for statistics. We doubled checked the consistency throughout the manuscript
Editor: could you explain that choice to the readers somewhere in the text?
Authors v3: it was added in the first paragraph of statistical analysis.
Line 232 “All measures extracted from videos or sound analysis are named parameters throughout the texts. The symmetrical distribution of parameters (behavioural on the one hand and acoustic on the other hand) was visually inspected, and linear transformations were computed when necessary to reach symmetrical distribution (see tables 2, 3, 4). When this criteria was reached, Principal Component Analyses (PCA, one for the behavioural analysis and one for the spectral acoustic analysis) were performed using several parameters to build scores [‘dudi.pca’ function from ‘ade4’ R package (Dray & Dufour, 2007) and ‘inertia.dudi’ function to extract the loadings]. These scores were then used as statistical variables.”

Editor: The figure 4 is confusing. The title is “effect of trial number” but on figures B and C you report difference between treatments. The fact that you don’t use the same code to report on significant results on all Fig is also a bit confusing. In addition, what are the z and y for in fig B? I suggest that

- you show also the results from the various trials on Fig 4B and C
- you add letters to show what is different from what
- you explain in the legend what time effects or treatment effects (or interactions) are significant

Authors v3: the idea of Figure 4 was to show, in a condense way, single effects that were found on behavioural and boolean variables. The version currently in the manuscript (see Line 392 and below) allows to see single effect of Time on CondPC1 and CondPC2 (A) + single effects of treatment (A,B) on CondPC2 and ConPC3 in the most condensed way to also visualize the behavioural space of each group. Confusing symbols showing significance were removed or clarified in the legend.

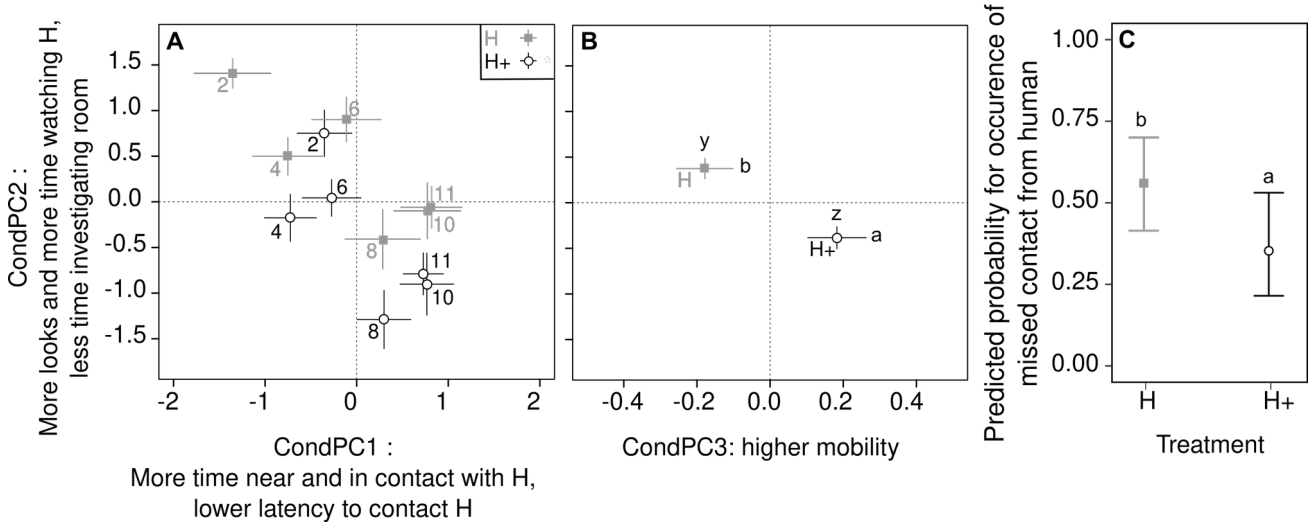


Figure 4: Behavioural variation of responses of piglets according to the sessions of additional positive contacts of the conditioning (A), and to the treatments (B, C). (A, B) Mean ± SE per group, numbers in (A) refer to the trial number of the conditioning. Higher CondPC1 and lower CondPC2 over time (single effect of trial number, A) and well as higher CondPC2 scores in H piglets than H+ piglets regardless of time (single effect of treatment, B). Higher CondPC3 and lower CondPC2 scores of H+ piglets compared to H piglets (single effect of treatment, B). (C) Mean estimates ± 95% confidence interval from the generalized mixed effect model. Lower probability of occurrence of missed contact by the human in H+ piglets (significant single effect of treatment following non significant interaction with trial number).

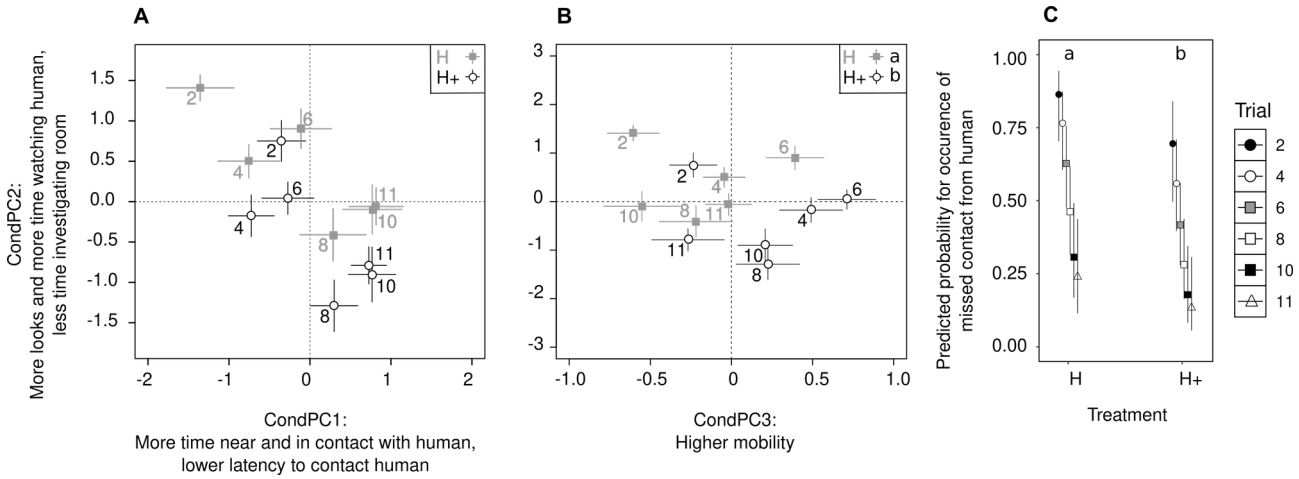
H: grey full squares, H+: black empty circles.

(B, C) Values with no common letters differ significantly: a and b for CondPC3, y and z for CondPC2 (B), a and b for probability of missed contact (C).

Full statistical report is available as supplementary material (tables S1 et S2 for statistical tests, table S3 for model estimates).

However, taking into account your comment, below is the version you suggested. We think it requires the reader more attention to extract the significant results among the ones that are not significant. In the version below, 4A remained the same, removed confusing indication on significance of the continuous variable “trial number”. 4B depicts the (non significant) interaction between treatment and trial

number. Compared to the suggestion in manuscript, from proposal 2 to 1, points from all H group and all H+ group are gathered (since no effect of trial was found for CondPC3). 4C depicts the (non significant) interacting effect of trial number and treatment.



We think the figure currently in the manuscript reflects better the findings in a more condensed way, however, we could choose proposal 2 if you think it is more accurate.

Editor: Figure 5. the proper wording is “values with no common letters differ significantly”. Indeed ‘ab’ has different letters than ‘a’ or ‘b’ but is not statistically different from them
I tend to have the same comment than for Fig 4, that is the same code (letters) should be used in Fig C, unless it gets very messy
Authors v3: It has been changed. See Figure 5, line 409.

Authors v2: “ The effect of the human did not interact with the conditioning time, leading to the conclusion that the difference between the two experimenter may have establishment during the period of positive handling at weaning, prior to the conditioning.” Line 684
Editor : please correct into The effect of the human did not interact with the conditioning time, leading to the conclusion that the difference between the two experimenters may have established during the period of positive handling at weaning, prior to the conditioning
Authors v3: it was changed. See line 635

Authors v2: “We may be able to hypothesize a sequential establishment of a positive HAR over time: firstly with a decrease of attentive state and an increase in proximity and accepted contacts, and secondly with a disinterest of human contacts and the expression of natural foraging behaviour. The latter may require a higher exposure time.” Line 573
Editor: This conclusion is based on the observation of behavior. Does the analysis of grunts support it? What the relation between the changes in behavior and grunts?
Authors v3: Yes, please find below answer to this question when explaining how the discussion was changed.

Editor:
About the discussion:
I also think the discussion is not easy to follow, especially L588-679. The discussion would benefit from being shortened in length and focusing on the interpretation of grunts. Currently, you are discussing a lot the animal's behavior. In fact, the behavior helps you verify that your experimental design is adequate to produce different qualities of HAR and then allows you to analyse how grunts vary with that quality. You could simplify the discussion of behavior (since that is not the focus of your paper), by avoiding going back and forth in your interpretation and rather offering an interpretation from the start that matches the responses observed both when the human is static or interacting. Then, the grunts should be analyzed with respect to the behavioral interpretations. These are present in your current discussion but are somewhat diluted in the behavioral discussion.

Authors v3: Following your suggestions, we re-wrote the section of the discussion titled “Links between vocal expression and positive HAR” (Line 527). We divided it in paragraph discuss each aspect of each tests, confronting the behavioural and vocal results according the valence-arousal model of vocal expression.
- “A positive HAR is reflected by shorter grunts in presence and absence of a human” Line 528 and following paragraph
- “A positive HAR affects vocal reactivity toward a static human” Line 554 and following paragraph
- “Providing rewarding additional positive contacts triggers short and high pitched grunts” Line 584 and following paragraph

The first paragraph of the discussion was not changed. Indeed, a behavioural analysis is paramount in this paper, as it provides several indicators to describe the HAR without taking into account the grunts first. Indeed, if we want to make the point that grunt structure may be an indicator of the quality of the HAR, then the first step is to be able to describe the HAR without the potential indicator. The discussion on how vary this potential indicators with the HAR we described before could only be the second step. A similar methodology is usually applied to study vocal signals as indicators of emotions. That is why we would like the results of the behavioural analysis to be discussed deeply before going into the discussion about the vocal flexibility. They were thus kept in the first paragraph (500 words for discussion of two types of test). Line 483 and following paragraph

A header was also added at the beginning of the discussion to explain the process. Line 467 and following paragraph.

We hope the re structuring improved the clarity of the discussion.