Note to Compare Four Papers by Haim Levy and Moshe Levy

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This note compares four papers by Haim Levy and Moshe Levy. The authors will be referred to as LL, and their papers will be referred to according to the journals where they appeared, through EL (Economic Letters), JRU (Journal of Risk and Uncertainty), MS (Management Science), and OBHDP (Organizational Behavior and Human Decision Processes); see the references at the end of this note. This note argues that there is much overlap between these four papers that is not made explicit by the authors. In particular, ideas and experiments are presented as if new whereas they were published in the other papers as well. There are no cross-references between the four papers apart from one: The MS paper once refers to the EL paper, be it in an insufficient manner.

In all citations from the LL papers below, italics are from the original and bold printing has been added here. When reading citations of LL, it should be kept in mind that their terms "risk aversion," "risk seeking," and "preference" mostly refer solely to the utility function. Risk aversion mostly just means concave utility and risk seeking mostly just means convex utility. More comments on unconventional terminologies of LL are in Appendix C.

The research question that the authors study concerns the shape of utility, and risk attitudes, for gains and, separately, for losses. The authors do not consider trade-offs between gains or losses so that loss aversion (the exchange rate between gain- and loss utilities, or, say, the nondifferentiability-kink of utility at zero) plays no role for their findings and discussions. This point is explained correctly in OBHDP, last paragraph on p. 1076.

Section 1 presents the overlaps, and absences of cross-references, regarding the data and experiments in the four papers. Section 2 addresses the, more subtle and more lengthy, issue of overlaps and absences of cross-references regarding ideas expressed in the papers. A number of other issues are discussed in appendices.

1. Overlapping Experiments and Data

In all four papers the authors use exactly the same general format of stimuli, of which only the opening text will be cited here:

> Suppose that you decided to invest $10, 000 either in stock F or in stock G. Which stock would you choose, F or G, when it is given that the $ gain or loss one month from now will be as follows ...

Virtually all of their data are presented, as if new, in at least two papers. The only cross-reference in the four papers is:

"This contradiction of risk aversion is consistent with the findings of Levy and Levy (2001)." (MS p. 1344 1st column last sentence of next-to-last para),

which is too weak a cross-reference given that the stimuli and data are in fact identical. The various gambles will be listed hereafter that have appeared in at least two papers. Besides these, there are some data in Experiments 2 and 3 of JRU that have not been reproduced elsewhere, probably because these data are not very interesting. There is also one (interesting!) gamble choice in OBHDP (Task 3.II, also 4.II, on p. 1071), that was not reproduced elsewhere, and MS p. 1342 Task 1.III, a simple test of stochastic dominance, was not reproduced elsewhere. Other than that, all data have been double- or triple-published. Here are details.

GAMBLE CHOICE: (–3000, 1/2; 4500, 1/2) ≻ (–6000, 1/4; 3000, 3/4) (*Double publication*);
Hypothesis tested: PSD (versus MSD in MS);
Sample: 132 students, 66 professors, 62 practitioners;
MS p. 1342 Task 1.I;
OBHDP p. 1069 Experiment 2 (77 students added).

GAMBLE CHOICE: (–500, 1/3; 2500, 2/3) ≻ (–500, 1/2; 2500, 1/2) (*Triple publication*);
Hypothesis tested: FSD (first stochastic dominance);
Sample: 132 students, 62 practitioners;

EL p. 236 Task I;
JRU p. 280 Task 1.I;
MS p. 1342 Task 1.II (with 66 professors added).

GAMBLE CHOICE: (–500, 1/4; 500, 1/4; 1000, 1/4; 2000, 1/4) ≺ (0, 1/2; 1500, 1/2) (*Triple publication*);
Hypothesis tested: SSD (second stochastic dominance) and mean-variance rule;
Sample: 132 students, 62 practitioners;
EL p. 236 Task II;
JRU p. 280 Task 1.II;
MS p. 1342 Task 1.IV (66 professors added to the sample); MS p. 1344 1st column last sentence of next-to-last para gives the only cross-reference in these four papers, mentioned before in this note: "This contradiction of risk aversion is consistent with the findings of Levy and Levy (2001)." A "consistent finding of risk aversion" is an understatement because the two experiments are identical in all respects except that 66 subjects were added for MS, without changing the basic findings.

GAMBLE CHOICE: (–1600, 1/4; –200, 1/4; 1200, 1/4; 1600, 1/4) ≺
(–1000, 1/4; –800, 1/4; 800, 1/4; 2000, 1/4) (*Double publication*);
Hypothesis tested: PSD (prospective stochastic dominance) versus MSD (Markovitz stochastic dominance);
Sample: 84 students;
MS p. 1344 Experiment 2;
OBHDP p. 1071 Task 4.I (Task 3.I replicates it with real incentives and 105 students and 38 practitioners.)"

The following three gamble choices concern Experiment 3 of MS and Experiment 1 of OBHDP, which are completely identical.

GAMBLE CHOICE: (4000, 0.80; 0, 0.20) ≺ (3000, 1): (*Double publication*);
Hypothesis tested: replicating Kahneman & Tversky (1979, p. 268);

Sample: 129 students, 51 practitioners;
MS p. 1345 Task 3.I;
OBHDP p. 1066 Task 1.I (the first outcome should be 4000 not −4000; the word must is italicized in OBHDP not in MS).

GAMBLE CHOICE: (−4000, 0.80; 0, 0.20) ≻ (−3000, 1): (*Double publication*);
Hypothesis tested: replicating Kahneman & Tversky (1979, p. 268);
Sample: 129 students, 51 practitioners;
MS p. 1345 Task 3.II;
OBHDP p. 1066 Task 1.II.

GAMBLE CHOICE: (−1500, 1/2; 4500, 1/2) ≻ (−3000, 1/4; 3000, 3/4) : (*Double publication*);
Hypothesis tested: PSD (prospective stochastic dominance) versus MSD (Markovitz stochastic dominance);
Sample: 129 students, 51 practitioners;
MS p. 1345 Task 3.III;
OBHDP p.1066 Task 1.III.

2. Overlapping Theoretical Novelty Claims

For ideas that are not new in a field but are neither common, priority should be credited to other papers. This section discusses such ideas in LL, for which cross-references should have been given in view of the novelty suggested, but weren't. Pointing out overlaps between ideas, as in this section, is more complicated, and less clear-cut, than overlaps between data, as in the preceding section. Here also the global aspect of the total amount of overlap matters.

2.1. The Use of Mixed Gambles (Quadruple Publication)

The use of choices between nondegenerate mixed gambles for the research question described above is suggested to be new, without any cross-reference, in all four papers. Here are citations.

EL

P. 234 ℓ. –8 till –5: "In this paper we report on an experimental study which is based on a **methodology fundamentally different than the one used in previous studies**. Our experiment is conducted with realistic bets in which both positive and negative outcomes are possible, ..."
See also: p. 225 next-to-last sentence of Section 2; p. 239 2nd para 1st sentence.

JRU

P. 267 4th para ℓ. 8–10: "This methodology allows us to conduct experiments with realistic bets in which both positive and negative outcomes are possible, **in contrast to previous experiments** dealing separately with positive bets and with negative bets."
See also: p. 278 ℓ. 15–17;p. 286 1st sentence of 2nd para.

MS

Abstract ℓ. 5: "We conduct an experimental study with *mixed* prospects, ..."
See also: p. 1346 ℓ. –7 till – 5.

OBHDP

P. 1065, ℓ. –13 till –9: "This experiment has two purposes. ... Second, to test the existence of an S-shaped value function when the subjects face mixed prospects with no certain outcome."

MS and OBHDP put "PSD" and "MSD" stochastic dominance criteria central as tools to avoid nonmixed gambles, and, therefore, further citations on the use of mixed gambles will be given in the next Subsection. MS Experiment 3 (pp. 1345–1346) and OBHDP Experiment 1 (pp. 1065–1069), which are completely identical, aim to experimentally demonstrate the novelty of using mixed gambles as compared to using nonmixed ones. Other citations, on the use of stochastic dominance and given in the next subsection, also concern the use of mixed gambles, the topic of this subsection.

Contrary to the novelty suggestion of LL, there have been several papers preceding the works of LL that used choices between nondegerate mixed gambles and that studied the shape of utility functions for gains and losses (Fennema & Van Assen 1998; Loehman 1998; Lopes & Oden 1999; Luce 2000 Chapters 6 and 7; Payne, Laughhunn, & Crum 1980, 1981; Slovic 1969; Tversky & Kahneman 1992 Table 5 Problems 5 and 6).

2.2. The Use of Stochastic Dominance (Quadruple Publication)

All papers present, without cross-reference, the idea that stochastic dominance conditions[1] avoid the problems of certainty-equivalent, and nonmixed, choice questions. Here are citations.

EL

P. 235 next-to-last sentence of 2nd para: "In this paper we employ Stochastic Dominance criteria with realistic uncertain investments in which both positive as well as negative outcomes are possible, which is a setting typical of investments in the stock market."
See also: p. 239, 1st sentence of last para.

JRU

P. 267 4th para ℓ. 5–7: "Then, we report on three experimental studies, which are based on *stochastic dominance* rules, i.e., we employ a methodology, **which is fundamentally different** from the *certainty equivalent* method used in most previous experimental studies."
See also: p. 279 Section 2.3.1 1st sentence; p. 286 1st sentence of 2nd para.

MS

P. 1335 1st column, last sentence: "The PSD and MSD criteria allow us to test the prospect theory S-shaped value function hypothesis and the Markowitz reverse S-shaped hypothesis in a framework which avoids the serious problems of the more traditional certainty equivalent approach."

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[1] SSD, second stochastic dominance, in EL and JRU; PSD, explained later, in OBHDP; PSD and MSD, explained later, in MS.

See also: p. 1338 top; p. 1346 ℓ. –7 till –4.

OBHDP

Sentence on pp. 1074–1075: "In this study we employ the recently developed *prospect stochastic dominance* (PSD) criterion to experimentally test the S-shape preference hypothesis with *mixed* prospects and no *certainty effect*."

See also: abstract ℓ. 6–8; p. 1061, last sentence of Section 1.1; p. 1075 ℓ. 10–14.

2.3. Criticisms of Earlier Studies

This subsection does not concern topics for which LL make priority claims, but instead literature references that they give. It shows the big overlap of the four papers in this regard, and the *absence* of priority crediting. All four papers suggest (incorrectly), that (all) earlier studies:

- Only used choices with degenerate (riskless) gambles so that the certainty effect played a role, or choices between nonmixed gambles, i.e. gambles with all outcomes nonnegative or all outcomes nonpositive. LL argue that such choices used in earlier studies are not realistic, and that the choices that LL consider, between nondegenerate mixed gambles, are more realistic.
- May have been affected by probability transformation and framing (the authors probably use the latter term in a nonconventional manner, to refer to the use of nonmixed gambles if mixed is to be realistic).

Here are citations and references to the LL papers regarding these claims:

EL

P. 235 ℓ. 1–6 (this text is the same as JRU p. 277 beginning of Section 2.1; see below): "To study the shape of the utility function, it is common to present the subjects a choice between a certain payoff and an uncertain payoff with only two possible outcomes. To figure out whether the utility function is concave or convex, generally the subjects are asked questions

regarding their choices between alternatives in which only positive outcomes are possible, and then they are asked separate questions regarding their choices between alternatives in which only negative outcomes are possible."
See also: p. 234 second half of 2nd para; p. 239 1st para last five lines.

JRU

Although no systematical search for identical texts was done, it turned out that the text at p. 277 beginning of Section 2.1 is completely identical to the text of EL p. 235 ℓ. 1–6 just cited. In fact, also the sentence after is identical, and the whole para of EL is reproduced except that LL filled in a different gamble pair with different probabilities and outcomes.
See also: pp. 277–278 first two paras of Section 2.1.

MS

P. 1346 last para 1st sentence: "In **the** previous experiments the certainty equivalent approach was employed, hence, in order to characterize the properties of the value function there was no practical choice but to use nonmixed bets. ..."
Abstract last sentence: "It is possible that **the** previous results supporting the S-shaped value function are distorted because the prospects had only positive or only negative outcomes, presenting hypothetical situations which individuals do not usually face, and which are certainly not common in financial markets."
See also: abstract, ℓ. 2–6; p. 1335 2nd column ℓ. 3–7; all of p. 1337; p. 1346 1st column end of penultimate para; p. 1346 second half of 1st para of Section 4; p. 1347 2nd para last sentence.

OBHDP

P. 1061 2nd para: "Thus, until recently the certainty equivalent approach with non-mixed bets **was the only practical way** to test the S-shaped value function hypothesis, and it was therefore widely employed despite its drawbacks."
P. 1074 2nd para of Section 6: "The S-shaped function result is concluded from the certainty equivalent analysis of experiments with prospects with only positive or only negative outcomes, **but *not* with prospects with *mixed* outcomes**, which characterize virtually all

investments in practice. Also, the results of the certainty equivalent approach may be affected by probability distortion and particularly by the "certainty effect." "

See also: abstract ℓ. 2–6; sentence on pp. 1059–1060; p. 1060 2nd para; p. 1068 ℓ. 2–5.

- LL relate the drawbacks of unrealistic options to framing of Kahneman and Tversky:

EL p. 235 2nd para ℓ. 1–4;

JRU p. 278 ℓ. 8–10;

MS P. 1337 2nd column just after the middle.

- LL argue that researchers typically derive utility for gains from certainty-equivalents for nonmixed gambles, because with mixed it would require many questions:

EL p. 235 Footnote 4 2nd sentence;

JRU p. 278 ℓ. 2–5;

MS pp. 1336–1337 beginning of Section 2, comparing (1/2, −1000; 1/2, 2000) with 400 for sure;

OBHDP pp. 1060–1061: Exactly the same argument and choice situation (plus figure) as in MS pp. 1336–1337.

2.4. Supposed Avoidance of Probability Transformation (Double or Triple Publication)

In EL, MS, and OBHDP the authors make the (ill-founded) claims that for gambles with reasonably large probabilities, probability transformation is unlikely, and that for gambles with equally likely outcomes, probability transformation is also unlikely. In OBHDP they do cite deviating views from others (Luce 2000 and Tversky & Kahneman 1992), maybe because Luce was a nonanonymous referee (see p. 1076 Acknowledgment).

Remarkably, the text in JRU on probability transformations is better. Although LL do not seem to use correct formulas, e.g. on p. 268[2], their interpretations of the implications of probability transformation for the measurement of utility seem to be basically correct. They do not make the ad hoc assumptions of no transformation for probabilities that are not small or for probabilities that are identical.

That LL show awareness of probability transformation in JRU and partly in OBHDP, but not in the other papers, is amazing. Why did they ignore these arguments, and incorretly analyze their data, if they were aware of these arguments? This point will be discussed further in Section 3. Here are citations.

EL

P. 234 ℓ. –6 till –4: "… probabilities are relatively large, …so that subjective probability distortion is not likely to be significant and there is no certainty effect."
See also: p. 237 2nd para last sentence.

P. 237 Footnote 5 ℓ. 4–11: "Notice that in Task II in each alternative the experimentally stated probabilities are equal for all outcomes, so that … no probability distortion takes place. … This suggests that probability distortion did not play an important role …"

MS

P. 1341, 2nd column, ℓ. 5–9: "All probabilities given in the experiments are relatively large ($p \geq 0.25$), … hence it is unlikely that subjective probability distortion plays an important role in the decision-making process."

See also p. 1346 2nd para of Section 4 ℓ. 5–7.

P. 1344, end of Design of Experiment 2: "Second, in Experiment 2 all the outcomes are equally likely. This is an attractive feature, because it makes any subjective probability distortion very unlikely."

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[2] LL should either take cumulative weights if taking all outcomes as gains, or, more plausibly, if they take negative outcomes as losses, then there should be a loss aversion factor leading to nondifferentiability of utility at zero. There should also be sign-dependence with w different for gains than for losses, as LL seem to recognize only later, in Eq. 7 at p. 270.

OBHDP

P. 1065 last two sentences of Section 1: "In Experiments 1 and 2, probability distortion is dealt with by employing moderate probabilities. In Experiments 3 and 4, in addition to employing moderate probabilities, we also design prospects to have symmetric probability distributions or …"

P. 1068 point (c) 2nd sentence: "The smallest probability in Task III is .25, which is not considered to be very small, and therefore it is not likely that probability distortion plays an important role in this task."

See also: p. 1070 last sentence of Section 3; p. 1075 ℓ. 8–10.

OBHDP p. 1063 penultimate para suggests, strangely enough, that "most" studies focusing on the shape of utility ("preference") have used moderate probabilities and have assumed that these would not be transformed (also p. 1064 last para 2nd sentence). So, LL claim that their incorrect claim (applied to the probabilities in their experiment!) has been widely accepted by others.

OBHDP para on pp. 1064 – 1065: As in the other three papers, LL cite Quiggin (incorrectly, see Wakker 2003), Viscusi, and the original 1979 prospect theory for the claim of absence of transformation for symmetric probabilities. They, however, also cite Luce (2000) and the current (cumulative) version of prospect theory for the opposite claim, that equally likely probabilities can be transformed differently. At other places in OBHDP, LL adhere to their assumption of equal weighting of equal probabilities (p. 1070 ℓ. –9: "Probability distortion effects are neutralized in this experiment by employing symmetric probability distributions (Task I) and …"). For the latter, see also OBHDP p. 1065 last sentence before Section 2.1 and p. 1075 4th para 2nd and 3d sentence.

References to Quiggin (1982) (incorrect according to Wakker 2003) for the claim that equal probabilities are not transformed are at:

JRU p. 269 ℓ. –6; 286 2nd para ℓ. –3;

MS p. 1344 Footnote 15;

OBHDP p. 1064 next-to-last para ℓ. – 3, repeated on p. 1064 ℓ. –8; p. 1075 4th para ℓ. 3.

2.5. Supposed Findings of Violations of Concave Utility (Including S-Shaped Utility) for Gains (Triple Publication)

The EL, JRU, and OBHDP papers present the empirical finding of violations of concave utility for gains through choices between mixed gambles, suggesting each time that it is new. The MS paper also brings this finding as if new, but with one reference saying that its findings in this regard are "consistent" with those of the EL paper:
"This contradiction of risk aversion is consistent with the findings of Levy and Levy (2001)." (MS p. 1344 1st column last sentence of next-to-last para)

The claimed falsifications of the S-shape of prospect theory will also be listed here, because concave utility for gains is part of the S-shape. Here are citations.

EL

P. 235 end of Section 2: "... we show experimentally that individuals are not generally characterized by risk aversion."
See also: abstract last sentence; p. 238 Section 4 last sentence; p. 239 next-to-last (italicized) sentence.

JRU

Abstract ℓ. 5: "We present three experiments revealing a striking result: a large proportion of the subjects' choices contradicts risk-aversion."
See also: p. 267 penultimate para penultimate sentence; p. 281 ℓ. 5; p. 286 4th para.

MS

p. 1347 1st sentence: "Using the PSD criterion and mixed bets, based on the experimental results of three distinct groups of subjects (students, university professors, and practitioners), we conclude that the S-shaped preference is rejected."

See also: abstract ℓ. 7–9; p. 1338 next-to-last sentence of Section 2.1; p. 1343 1st column last full sentence; sentence on pp. 1344–1345.

OBHDP

P. 1075 ℓ. 1–2: "We strongly reject the S-shaped value function hypothesis."

Abstract ℓ.–2 till –4; p. 1059 last sentence before Section 1.1.

P. 1075 penultimate para.

P. 1067 2nd para;

2.6. Supposed Novelty of Empirically Testing the PSD Criterion (Double Publication)

The PSD criterion consitutes a combination of second stochastic dominance (kind of strong risk aversion) for gains and reversed second stochastic dominance (kind of strong risk seeking) for losses. Under EU, PSD is equivalent to concave utility for gains and convex utility for losses. Both the MS and OBHDP papers present the testing of this condition as if new, as they present, obviously, the supposed empirical rejection found of PSD. (Both refer to earlier papers for the theoretical definition of the criterion.)

Here are citations:

MS

P. 1346 last sentence: "For the **first** time, we use a recently developed investment criterion called Prospective Stochastic Dominance (PSD), and ..."

See also: abstract ℓ. 5–7.

OBHDP

P. 1061, last sentence of Section 1.1: "The recently developed PSD criterion allows us to test this hypothesis with mixed bets and with no outcomes which are certain, **which is the main thrust of this paper**."

See also: Abstract ℓ. 6–8; p. 1059 2nd sentence of last para above Section 1.1; pp. 1071–1073 Section 4.2; p. 1074 Section 5.1.

2.7. Supposed Novelty of Defining and Empirically Testing the MSD Criterion (Double Publication)

The MS paper presents as if new the theoretical definition of the MSD criterion. If new, the MSD criterion would be a straightforward new idea, because it simply reverses the conditions of PSD (as usual, given same expectations; this point is less substantial than MS, p. 1340, last para may suggest, and Corollary 1 on MS p. 1341 is straightforward). The MSD criterion consitutes a combination of reversed second stochastic dominance for gains and second stochastic dominance for losses. Under EU, MSD is equivalent to convex utility for gains and concave utility for losses. Because the MSD criterion does follow so naturally from PSD, it is hard to avoid mentioning it when discussing PSD. Indeed, the basic idea of MSD is stated in words in OBHDP, so that its theoretical definition in MS is not new (or at least there is double-publication of the MSD idea); see (OBHDP, p. 1073 first full sentence):

"... but G dominates F **for all reverse S-shaped functions as suggested by Markowitz (1952b)**"

Compare this formulation to the same formulation of the principle in MS p. 1335 1st column ℓ. –9 till –6:

"MSD is a criterion that determines the dominance of one investment alternative over another ***for all reverse S-shaped functions*, as suggested by Markowitz (1952b)**."

The MS paper also presents as if new the empirical testing of MSD. This testing is, however, the same as testing PSD in their stimuli (which have same expectations), because one is the exact opposite of the other in their tests. Indeed, all data used in MS to test MSD are *identical* (except that in one choice situation the OBHDP paper has some subjects added, without affecting the result) to those used in OBHDP to test PSD (see Section 3).

Here are citations:

MS

P. 1335 1st column at 2/3 of last (big) para: "We also employ for the **first** time a new criterion called Markowitz Stochastic Dominance (MSD), which is developed in this study."

See also: abstract ℓ. 5–7; p. 1338 1st sentence; p. 1338 Section 2.2 1st sentence; p. 1346 last sentence.

Appendix A. Absences of Overlaps (Ignoring Relevant Counter-Arguments)

In several of their writings LL show awareness of probability transformation (OBHDP abstract last sentence, p. 1063 Section 1.3; JRU sentence on pp. 281–283 and many other places).[3] It is amazing that LL did not carry out the required calculations at places where such calculations would have refuted their claims. The latter holds, for instance, for all three "head-to-head competitions" in the MS paper (Wakker 2003), all of which also appeared in OBHDP. The JRU sentence on pp. 281–283 is: "It is possible, exactly like the analysis in Section 1, that investors indeed have a concave utility function, however, due to probability distortion they behave "as if" they are risk-seekers." A similar statement is at JRU p. 286 ℓ. 1–3. These sentences, in fact, refute LL's claims made in MS. They also refute claims in JRU elsewhere, where they still claim that their data reveal risk aversion and where risk aversion means concave utility. How can LL write these contradictory things?

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[3] LL sometimes (JRU p. 270 l. -5 till -3, p. 282 Figure 6, OBHDP p. 1072 Fig. 4.c), but not always, normalize decision weights for cumulative prospect theory, which is not correct and generates violations of monotonicity. This mistake may be due to LL's questionable interpretation of decision weights as misperceived probabilities, or to an incorrect suggestion of Tversky & Kahneman (1992, p. 179, l. –6) about normalization that, however, referred to original prospect theory and not to cumulative prospect theory. JRU, Section 1, is discussed elsewhere.

It is strange that OBHDP uses the assumption of equal weighting to claim convex utility in Experiment 3, but allows for the different assumption of different weighting to claim convex utility in Experiment 4 (p. 1070 last sentence before Section 4.1: "the probability distortion factor is taken into account **(with two different approaches** …"). Why does OBHDP not discuss different weighting in Experiment 3, if not because it would give counterevidence against the claimed convex utility and would refute LL's claims?

The OBHDP paper has some references to works with mixed gambles that also have implications for the topic of the LL papers, the shape of utility for gains and losses through mixed gambles, although this is not what these works were cited for by LL (they were cited for casting doubt upon bilinearity, an assumption underlying prospect theory but questioned by Luce, the nonanonymous referee of OBHDP, and some authors inspired by Luce). Maybe the references in OBHDP only came in after suggestions by the nonanonymous referee Duncan Luce.

As a remarkable aside, OBHDP's Task 4.II (also 3.II; see p. 1073 there), which is not double-published, does give a violation of the parametric estimations of Tversky & Kahneman (1992). This finding is no evidence against CPT in general, but it is against the parameters of Tversky & Kahneman (1992). It suggests to me that the extremity-orientedness can be stronger than Tversky and Kahneman's (1992) parameters predict. This empirical finding of LL is interesting and brings new insights. Another interesting point of LL's research is that, while there have been some studies into nondegenerate mixed gambles before, there haven't been many such, and the general plan of a detailed study thereof with stimuli as in LL's papers, does seem to be interesting. It must, therefore, be regretted that the findings other than Task 4.II of OBHDP, all with incorrect interpretations, were published also.

Appendix B. Overlaps of Didactical and Expository Material

Besides the overlaps in novelty claims, the papers have many more overlaps. In general, it cannot be avoided that specialists, when writing papers that should be accessible to wide audiences, have to repeat elementary facts of their research in many papers again. The four papers of LL have much overlap also in this regard. Here it also seems that abbreviations and

references to explanations in other papers would have been desirable. Because this point is a matter of taste and quality, and is less crucial for the judgment of ethical inappropriateness, details are omitted.

The following line of reasoning appears in all papers, usually both in the introduction and conclusion: EU is classical, Friedmann & Savage (1948) suggested convex parts of utility, Markowitz (1952) modified, the explanation of prospect theory with its four deviations from the classical model, the various shapes of utility (concave, S-shaped, etc.), the detailed explanations of the general concept of stochastic dominance, the claimed "dramatic" implications for classical economics of the findings of the papers, the extensive appraisals that testing stochastic dominance does not mean testing something more specific about utility plus the corresponding references, that stochastic dominance criteria can be formulated independently of level of wealth, and the classes U_1, U_2, V_{KT}, V_M of utility functions.

EL, JRU, and MS test one or two first-stochastic dominance choices and, based upon the verification of first-stochastic dominance in their data, argue that the subjects are rational, well-motivated, are understanding all stimuli, etc. LL explain extensively and repeatedly that observing one or some instances in agreement with some hypothesis (SSD etc.) does not prove that the hypothesis holds in general, but that observing one violation of the hypothesis does prove that the hypothesis does not hold in general.

Here are relations between figures:

- MS p. 1336 Figure 1, the various shapes of utility, is the same as Figure 1 of JRU p. 266.
- MS p. 1337 Figure 2, the certainty equivalent of mixed gambles, is the same as Figure 2 of OBHDP p. 1061.
- MS p. 1343 Figure 3, general stochastic dominance, here for PSD (and then also MSD), is virtually identical to Figure 3 of OBHDP p. 1063 (only in the loss domain different outcomes are taken).
- JRU p. 281 Figure 5, general stochastic dominance, here for FSD, is identical to the upper part of Figure 1 of EL, p. 238.
- JRU p. 282 Figure 6, upper part, is identical to Figure 1, lower part, of EL p. 238 (only broader).

Remarkable is also that MS p. 1335 footnote 4, refers to a survey paper by Edwards (1996), but that OBHDP does not give this reference and, instead lists 29 of the 35 references from Section III.A of Edwards' paper on positive findings for prospect theory, with two references added (OBHDP Footnote 1 on p. 1059). The footnote then lists 3 of the 4 references from Section III.B of Edwards' paper (negative findings for prospect theory) with 7 references added.

Appendix C; Deviating Terminologies and Confusions

When reading the works of LL, it is useful to be aware of some terminologies that deviate from common conventions, and some confusions. Although the authors often refer to the possibility of violations of expected utility, many of their arguments are valid only under expected utility. Sometimes they explicitly mention the assumption of expected utility, but often they do not. In many parts of their text I was, therefore, not sure if the claims were intended to hold only under the assumption of expected utility, or in general.

Related to the above point is the following. LL mostly do not use the terms risk aversion and risk seeking as is commonly done, describing a preference between a gamble and its expected value. Instead, LL let risk aversion refer to concave utility and risk seeking to convex utility (e.g., EL p. 234 2nd para 1st sentence).[4] Under expected utility, the two definitions are equivalent, but in general they are not. The confusion of risk aversion with shape of utility can, unfortunately, be found in many other papers by authors who have been raised with the ideas and terminology of expected utility and have only recently come to work on nonexpected utility theories.

As an aside, LL's criticism of Kahneman and Tversky's findings on risk aversion in OBHDP, in the para on pp. 1068–1069, is due to nothing other than LL not being aware that they use the term risk aversion differently than Kahneman and Tversky and most others do. LL's incorrect claims that Kahneman and Tversky would have ignored probability transformation derives from the same misunderstanding. See OBHDP p. 1075 3d para 2nd sentence "In their analysis of risk-seeking and risk-aversion segments, Kahneman and

[4] An exception seems to be the penultimate sentence of the abstract in JRU.

Tversky (1979) treat the objective probabilities as given and ignore possible probability distortions." See many other places in OBHDP, e.g. p. 1065 ℓ. –7, p. 1075 ℓ. 3–4.

LL often use the term "preference" not in its usual sense, designating binary choice or comparison between choice options (gambles). Instead, in LL's terminology preference usually refers to the utility of outcomes (this is made explicit in OBHDP, p. 1061, Section 1.2 ℓ. 6).

Appendix D; Differences in Content of the Papers

Experimental stimuli that one paper contained but not the others were described at the beginning of Section 3. EL does not contain material other than what was discussed above. JRU contains a Section 1 that calculates risk premiums in the case of probability weighting. Section 2 contains material discussed above. MS neither contains material other than discussed above. OBHDP seems to mainly be an elaboration of MS, discussing the various issues at greater length. It also discusses probability weighting in Section 1.3, and has an extra page of discussion from p. 1075 till the end. Roy's safety concept, criticism of the bilnearity assumption (an assumption underlying prospect theory), and a discussion of loss aversion, are provided there.

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JRU:

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MS:

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