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Justification & Normality

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Normality Statement

NORMALITY STATEMENT
Use of *normally* in the following way:
- Sentential modifier: *Normally A*
- Conditional: *If A then normally B*
- Predicate Logic Operator: *S are normally P*

NO NORMALITY STATEMENTS
It is normal that A≠*Normally A*
If A then it is normal that B ≠ *If A then normally B*
It is normal that S are B ≠ *S are normally P*

Adjective: *a normal S / to be normal*
Adverb: *to do something normally*

Principle of Statistical Justification (SJ)

THE IDEA OF STATISTICAL JUSTIFICATION
A normality statement should be...
... justified by statistical knowledge!
... not accepted against better statistical knowledge!

STATISTICAL JUSTIFICATION I
Accepting "If A then mostly B" is a necessary condition for claiming "If A then normally B".

STATISTICAL JUSTIFICATION II
Not accepting "If A then not mostly B" is a necessary condition for claiming "If A then normally B".

Statistical Justification Examples

STATISTICAL JUSTIFICATION I
Most bears are shy or *Bears are mostly shy* is accepted whenever *Normally bears are shy* is accepted:
Normally bears are shy ⇒ Most bears are shy

STATISTICAL JUSTIFICATION II
Normally bears are shy is not accepted whenever *Not most bears are shy* or *Bears are not mostly shy* is accepted:
Not most bears are shy⇒ Not normally bears are shy

Principle of Epistemic Preference (EP)

THE IDEA OF EPISTEMIC PREFERENCE

Normality assumption order epistemic possibilities. There is a preference for most normal options. Less normal options are not excluded but less relevant.

PRINCIPLE OF EPISTEMIC PREFERENCE

Accepting “If A then normally B” is sufficient for an epistemic preference of B-worlds over Non-B-worlds among A-worlds.

Epistemic Preference Examples

ORDERING AND PRESUMPTION

If *Normally bears are shy* is accepted a shy bear is epistemically preferred over a bear which is not shy. *Normally bears are shy* and *Bruno is a bear* will let you presume *Bruno is shy*, unless you know better.

ORDERING AND CONJUNCTION

If Normally bears are shy is accepted and *Normally bears are strong* is accepted then *Normally bears are shy and strong* is accepted:

Normally bears are shy; Normally bears are strong ⇒ Normally bears are shy and strong

Intuitive Compatibility of EP and SJ

COMPATIBILITY

There seems to be no contradiction between EP and SJ

STATISTICALLY JUSTIFIED ORDERING

Normality assumptions have to be statistical justified **and** are (therefore) sufficient to prefer some epistemic options. *(generalizations and rules with exceptions)*

STATISTICALLY DENIABLE ORDERING

Normality assumptions are ordering assumptions but have to revised in the light of statistical information. *(prejudices)*

Rule of Conjunction Logical Incompatibility of EP and SJ

CONJUNCTION AND EP

If *A* is preferred and *B* is preferred *A&B* is preferred.
If *A1, A2... and An* are preferred then *A1&A2&...&An* is preferred.

CONJUNCTION AND SJ

That *Mostly A* and *Mostly B* are true does not guarantee that *Mostly A&B* is true.
That *Mostly A1*, *Mostly A2*,... and *Mostly An* are true does not guarantee that *Mostly A1&A2&...&An* is true.
It is known that it becomes more unlikely that *Mostly A1&A2&...&An* with increasing *n*.

Incompatibility and Epistemology

LOTTERY PARADOX

Increasing number of conjuncts which are believed →
More uncertainty believing the conjunctions

BELIEVE

Principle of probabilities vs. Principle of ordering

LOGIC OF *BELIEVE* AND *NORMALLY*

Principle of probabilities		Principle of Ordering
Statistical justification		Epistemic preference
	vs.	
Bayesian Accounts		Conditional Logic
Probabilism		Default Logic
Quantifier Theory		Ranking Theory

Logic of Epistemic Preference Veltman's Default Logic

Dynamic Logic of Normality(conditionals)
Similarities to Conditional Logic

Information states
1) Epistemic possibilities
2) Coherent ordering (with non-exceptional worlds)
Information eliminates epistemic possibilities.
Normality statements refine the ordering.

World w is normal iff w is least exceptional.
World w is optimal iff w is a least exceptional not eliminated world.
Accepting *Normally A* makes A-worlds less exceptional.
Presumably A must be accepted if A holds in all optimal worlds and may not be accepted otherwise.

Logic of Epistemic Preference Results of Default Logic

A1,...,An|=C iff after updating an ignorant information state with *A1,...,An C* is accepted (updating with C would not change the information state).

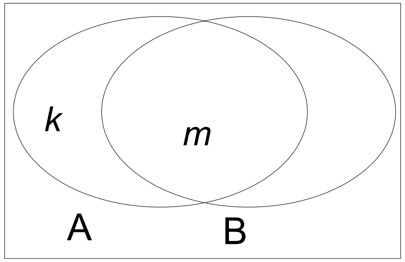
Normally A, Normally B |= Normally A&B
Normally A |= Presumably A
Normally A, ~A |≠ Presumably A

A then normally B, A |= Presumably B
A then normally B, (A&C) then normally ~B, A&C |= Presumably~B
A then normally B, C then normally ~B, A&C |≠ Presumably B

Logic of Statistic Justification MOST

DETERMINERS

$k=|A-B|$ and $m=|A\cap B|$
ALL A are B: k=0 (& m≠0)
SOME A are B: m≠0
MOST A are B: m>k
AT LEAST n %: m/(k+m)≥n/100



ADDING *MOST* to PL and *MOSTLY* to ML

$[A]^{\mathbf{M},g,x} = \{d: V_{\mathbf{M},g[x/d]}(A) = 1\}$

$V_{\mathbf{M},g}(\mathit{MOST}\ A\ B)=1$ iff $|[A]^{\mathbf{M},g,x} \cap [B]^{\mathbf{M},g,x}| > |[A]^{\mathbf{M},g,x} - [B]^{\mathbf{M},g,x}$

$[A]^{\mathbf{M}} = \{w: V_{\mathbf{M},w}(A) = 1\}$

$V_{\mathbf{M},w}(A\ \ \mathit{MOSTLY}\ \ B)=1$ iff $|[A]^{\mathbf{M}}\cap[B]^{\mathbf{M}}|>|[A]^{\mathbf{M}}-[B]^{\mathbf{M}}|$ or
$|\{w': w'Rw\} \cap [A]^{\mathbf{M}}\cap[B]^{\mathbf{M}}|>|\{w': w'Rw\}\cap[A]^{\mathbf{M}} -[B]^{\mathbf{M}}|$

Logic of Statistic Justification Probability

SYMMETRIC CONFIRMATION (CARNAP)

regular, individual sentences equally measured
evidence: Determiner (A,B); x is A
hypothesis: x is B
confirmation: c(h,e)=(m/k+m) | (k+m≠0)

CONFIRMATIONS FOR SOME DETERMINERS

ALL: c(h,e)=1 | SOME: c(h,e)>0 | MOST: c(h,e)>k
AT LEAST n %: c(h,e)≥n/100

PROBABILISTIC INFERENCES

$A_1,\ldots,A_n \models_{\text{probably}} C$ α iff
$c(C/ A_1 \&\ldots\& A_n) > c(\sim C/ A_1 \&\ldots\& A_n)$ or
$c(C/ A_1 \&\ldots\& A_n)$ is not defined .

Logic of Statistic Justification Results

RESULTS

If $A_1,\ldots,A_n \models C$ then $A_1,\ldots,A_n \models_{\text{probably}} C$
Most(A,B), Ac $\models_{\text{probably}}$ *Bc; Mostly A* $\models_{\text{probably}}$ *A*
Most(A,B), Ac, ~Bc $\not\models_{\text{probably}}$ *Bc ; Mostly A ~A* $\not\models_{\text{probably}}$ *A*

NORMALLY AS MOSTLY

Normally A, Normally B |≠ Normally A&B
In all cases A |= Normally A; Normally A|=In some case A
Normally A |= ~Normally ~A;~Normally ~A |≠ Normally A
Normally A|=probably A, Normally A, ~A|≠ probably A

Epistemic Preference Critics

NO VERIFICATION

No possibility of verifying normality statements by facts
No truth conditions

NO FALSIFICATION

No exclusion of normality statement and facts
No rules for revision of normality

STRANGE PRESUMPTIONS

Presumptions which are unlikely for logical reasons
No one expects things to be completely normal

Epistemic Preference Replies

NO VERIFICATION

Normality assumptions are not like facts.
They don't provide knowledge but order knowledge.

NO FALSIFICATION

Normality assumptions are not denied but they may become useless.
One should revise normality assumptions if they are not working properly (anymore).

STRANGE PRESUMPTION

A presumption can be more useful than no expectation even if it is likely to be false.
A wrong presumption can be a good guess.

Logic of Statistical Justification
Critics

<u>STATISTICAL INFORMATION AS CONDITION</u>
Statistical information not sufficient for accepting a normality statement.
Not clear that statistical information necessary for accepting a normality assumption.

<u>DIFFERENT SENSES OF *NORMALLY*</u>
Meanings of *normally* which have nothing to do with quantities, for example in normative contexts or in the sense of *naturally*.

<u>PSYCHOLOGY</u>
Statistical reasoning actually not used (properly)

Logic of Statistical Justification
Replies

<u>STATISTICAL INFORMATION AS CONDITION</u>
Its not necessary that *Mostly A* is sufficient or necessary for *Normally A*. That *s*ome statistical information excludes some normality statement is enough to accept a statistical account of normality.

<u>DIFFERENT SENSES OF *NORMALLY*</u>
But it is implausible to assume that normality assumptions have nothing to do with statistics, especially if they are used as foundation for presumptions.

<u>PSYCHOLOGY</u>
Typical fallacies can be explained otherwise: fuzziness, relevance principle.

Believe
Epistemological Conclusion

<u>LOTTERY PARADOX AND ORDERING</u>
Something is wrong in using *believe* for single sentence which can not be coherently believed together.
There is a difference between *it is probable for me that* and *I believe that*.

<u>LOTTERY PARADOX AND PROBABILITIES</u>
There is no paradox. The rule of conjunction for *believe* is invalid.

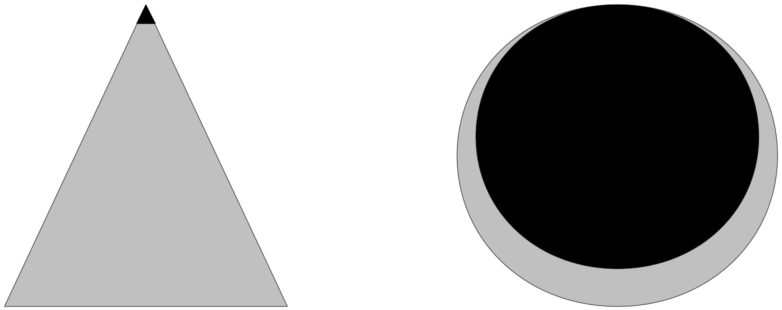
Two Kinds of Normality
Conclusion

Accepting the rule of conjunction leads to an understanding of normality according to EP but also to a rejection of SJ
If one accepts SJ one has to deny the validity of the rule of conjunction. In this case EP cannot be fully accepted.

There are at least two distinct concepts of normality.

Quantitative Normality: common, usual
Qualitative Normality: typical

Qualitative or Quantitative Normality
Top or Majority?



Epistemic
Preference

Qualitative
Normality

Statistical
Justification

Quantitative
Normality

THANK YOU!