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JUST LYING

Abstract. Lying is an ubiquitous element of communication. Amazingly enough, the topic is almost completely ignored by traditional logic. The usual example, Eubulides' antinomy, is not a good one: intuitively, "the Liar" doesn't lie. There are not many further approaches to be found in the literature. Why is this? There are quite a few reasons. We will consider them one by one and disclose further properties of lies at the same time. We sketch a general framework for the formal analysis of lying. As a result we observe that non-adjunctive calculi fits in here quite comfortably.

1. Motivation

Is there a logic of lying? Your immediate reaction to this question may range from sheer amazement to irritation: What has logic got to do with lying? Such a reaction seems legitimate on all counts: "the logic of lying" sounds a bit odd indeed. Of course, "logic of lying" means the formal structure behind these specific (speech) acts. We do not use the term as synonymous with "ideology" or "mechanism" as in "The Logic of War in Sudan" or "The Logic of Debt Relief for the Poorest Countries ". And yet, to some extent, your reservation will be confirmed in the course of this paper. However, the topic seems to contain some logical aspects after all. I will do my best to make them explicit.

There is a broad range of opinions concerning the role of lying. Some claim, it is just an art, not a sin. Others defend the opposite view. Be that as it may, lies are speech acts with an internal structure that serve rational aims. There are many other types of deceptive speech, to be sure:

pretending or faking, insinuation, reticence, half-truths, precondition or pre-supposition faking, deliberate ambiguity, pretending to lie, indirect lies and joke. Probably there is more of them. So it seems only natural to ask for any available analysis of that interesting and important phenomenon. This includes the quest for a formal analysis, or: for an analysis of the formal structure of lies. Obviously, there is a role to play for logic, too. Just to take one example:

She lied when saying that he arrived though not at Tuesday.

is analyzed as

What she really meant was: if he arrived at all then actually at Tuesday.

Helpful as this may be, it is certainly not the main concern of logic in this field. What logic should be after is a formal analysis of the phenomenon as such, not of particular lies. The latter is just a consequence of the former. However, there are few contributions to a logic of lying to be found in the literature. An analogical complaint can be heard from theoretical linguists. And also within psychology lying didn't receive too much attention. Anyway, philosophy has recently re-discovered the topic (e.g. [1], [5]) and so did psychology (e.g. [3], [17]).

My general interest is to further enlarge the realm of regular communication so as to include deceptive speech acts. Regular communication means communication what can be controlled by algorithmic means. So the question is: is it possible to effectively reconstruct all deceptive speech acts in formal terms. In other words: is a logical analysis of lying possible?

What does "logic" mean here? Logic is the field of research devoted to and making use of logical calculi (the latter may be called applied logic), i.e. consequence operations in some formal language. The characteristic point is: there is no extra-language reasoning. Of course, modern logic is more flexible and much more powerful than it was one hundred, or even twenty years ago. Recent work in cognitive science and especially in artificial intelligence drives logic e.g. towards non-monotonic, causal or inconsistency-tolerant forms of inference. Is this enough to hope for a framework that is sufficient for analyzing lies?

My tentative answer is: no, it is still not enough. You can't obtain a reasonable analysis of the phenomenon of lying by means of logic alone. Perhaps, this may sound as kind of heresy: Logic is competent for any form of rational thinking. Since lying is a rational business, logic should be able to handle this phenomenon. Of course, it would be naïve to hope for a complete and exhaustive analysis of lying by means of logic alone. But one

still might expect that logic comes up with a framework that grasps the essential features of lying.

2. Lying as an Element of Communication

Lying is an ubiquitous element of communication. This is not to say that lying is just normal talk. If lying would be the normal way in which we speak to each other, it would certainly undermine the conditions for its own possibility: expecting a lie prevents me from being lied to. "Ubiquitous" means that lies appear in almost all forms of communication and that they are much more frequent than one is usually inclined to think. So the first assumption I need to state is this:

> In many types of communication, lying is an important element.

There is plenty of evidence supporting that claim. Let me just add one minor point. Experiments conducted in cognitive psychology yield that lies are much more common in every day talk than a given speaker realizes. To find this out, researchers, together with the speaker have to investigate carefully the protocol of the given speech. Than they find an amazing number of lies. However, to my knowledge, a second aspect of this result has gone unmentioned so far: the interlocutor who listens to the subject does not catch the lies either! Being lied to is always a shock. The listener would certainly remember it. Some of the lies he does not catch. But some others he just doesn't register consciously. One might interpret this finding as follows: on the one hand, we do not remember all lies we tell, and on the other hand we do not register all lies we are told. Nevertheless we certainly make our speech sufficiently clear and we understand it reasonably well. That is, often we cope with lies quite well without even noticing them.

And I need a second assumption:

> Deceptive speech acts have some characteristic internal structure. Moreover, in order to be efficient they must respect certain requirements of rationality.

Perhaps, all kinds of human intellectual activity should respect some internal rational structure. Otherwise they will normally fail. In particular this holds for communication. Even a highly emotional outcry must fit into the given circumstances in order to carry the intended message.

Any such kind of rational rule following falls into the traditional realm of logic. And at least in that respect the phenomenon of lying is subject to logical investigation, too.

This, I admit, is an extremely weak connection. In that sense almost anything composes into a very large and very complex structure of—to quote the title of a recent book—"logic, lie and libido". Yet there should be a much more essential connection between the two topics. Ethology pretends that lying, conscious deception etc. are deeply rooted in the evolution of human intellect. Under the conditions given on Earth, they seem to be unavoidable preconditions for sheer survival of the higher species, and the more so for the rise of social life, enforcing intellectual progress and bringing about sophisticated forms of communication. So, far from being just a sign of moral defectiveness, lying seems to be a central element of any intellectual activity of man from its very beginning, cf. e.g. Volker Sommer's excellent book "Praise of Lying" ([14]).

Ethical aspects of lying are very important, and very complex (for a very fine reading see [4]). I do not attempt to address such questions in detail here. Instead, I will take it for granted that many instances of lie are morally acceptable—among them even lies with severe consequences.

2.1. True lies

At the outset, I will address a rather special point. Namely on the question whether it is possible to lie while saying the truth. A first intuition is: no, it's not. You can't lie by telling the truth.

Assume you perform any speech act communicating a fact. That speech act contains both an information and an implicit or explicit assurance "I hereby truthfully inform you that ... " So what you say is true and—due to the assurance of your utterance—you mean it to be true. Now turn to lying. Here comes a definition:

DEFINITION 1. A lied at t $\overset{\text{df}}{\Longleftrightarrow}$

1. A asserted at t that p,
2. A actively believed at t that not-p,

where

DEFINITION 2. A asserted p at t $\overset{\text{df}}{\Longleftrightarrow}$

1. A uttered at t the declarative sentence J meaning p,

2. by uttering J, A represented p as true

3. by uttering J, A m-intended an addressee B to actively believe that p.[1]

Lying is a rather special speech act, doubtlessly. On the one hand, it is impossible to lie overtly: *I hereby lie to you that ....* This can't be meant to be an explicit performative speech act. As an intended lie it simply lacks self-consistency. On the other hand, some sentences that are close to the above look quite reasonable: *It would be certainly a lie to claim that this paper is free of language mistakes.* But it seems impossible to announce a lie unconditionally.

That's where we are so far: A lie must contain some deception. The deception—it seems—can't be contained in the assurance-part. So the only way to lie is to be untruthful in the informative part of your utterance. In other words: lying means saying something wrong on purpose. Deception dwells on the constative part. That's standard. How than to lie by telling the truth? You may try this in a situation in which you are supposed to be lying anyway. Take the notoric example of being captured and interrogated by enemy troops. Under the circumstances you should conceal any possibly helpful information or—even better—give misleading information; i.e. lie!

Matters get muddled if your opponent is bright enough to foresee your tactics and hence distrusts the information you tell him. Therefore the best idea to deceive a (modestly) intelligent adversary is to tell her the truth. And you are justified in doing so, since you say nothing but the truth.[2] In some cases, however, this doesn't work. Imagine two men waiting at a Railway station in former Galicia (cf. [7], 109).

> *Where are you going, Moishe?*
> I need to be in Cracow tonight.

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[1]Here are some explications clarifying the above definition:

- A declarative sentence is to be defined by the grammar of the given language.
- The m-intention is just an intention that is necessary for the speakers attempt to produce a certain belief in the addressee by his very utterance. A uttered s with the m-intention to produce the belief that p def with the m-intention A meant p by uttering s; where meaning is Gricean non-natural (i.e. verbal) meaning.
- Active belief is meant to exclude cases where the speaker is merely accidentally or mistakenly in a state of a certain belief.

[2]This suggests a possibility to omit Immanuel Kant's dilemma. You should not lie even to your enemies, but you may try this: first demonstrate your hostile attitude, and then tell the truth. Good luck!

> *Oy vey—what a liar you are, Moishe! You want me to believe*
> *that you're going to Lemberg, but I happen to know that you*
> *really are going to Cracow. Why do you lie to me?*

In order to explain what is going on here one must refer to the communi-
cational background of both speaker and addressee. Mutual reflection may
complicate the analysis but there seems to be no essential obstacle to un-
derstand such cases.

But of course, things are not that easy all time. Sometimes, the assurance
of your utterance may be misleading, i.e. the deception can be hidden in the
performative aspect of your utterance. Once when Europe was still divided
by the iron curtain, and I found myself on the worse side, a friend of mine
surprised me saying:

> *I would like to be in Paris again.* I didn't know you had been to
> Paris?
> *I've never been there. But I often liked to be there and now,*
> *again, I would like to be in Paris.*

This seems to be an instance of what William Lycan calls Cohen's para-
dox ([9], 181). It turns out, when one wonders about what are the truth
conditions of sentences like these:

1. I report that the committee has voted unanimously to expel Grannie.
2. I advise you that it would be very stupid to buy more Daimler stock.
3. I warn you that my parrot has been starved for seven days and is peevish.
4. I declare that I have never travelled to Poland before.

Let us consider the last example. I have often been to Poland, that is true.
But it is also true that I just declared something. Hence, the sentence
I declare that I have never travelled to Poland before is O.K. The most
natural reaction would be to assume that the performative part is just the
assurance. It is always true and thus it makes no difference to the truth
of the whole utterance. That was Max Cresswell's proposal. But take into
account that you can make this performative part as long and structured as
you please:

> *Mindful that there is a just and mighty God in heaven who pun-*
> *ishes those who withhold information in courts of law and in*
> *mortal fear of the worm that dieth not and the fire that is not*
> *quenched, I admit that I have never travelled to Poland before.*

At some point the intuition gets fuzzy. It seems that the performative has some role to play after all—it contains a description of oneself. Therefore Lycan's proposal is to take two logical values for the above utterance: one for the statement (to be false), and another one for the sentence (to be true). This, however, is not yet a fully elaborated conception. So we assume that this case is still open.

The most striking examples are lies by mentioning tautologies. They are somewhat special insofar, as the intention to deceive is often hard to proof. Say, some smart guy is caught with insider trading. In a subsequent discourse about ethical aspects of stock markets somebody mentions: "You know, business is business". This can't be serious. So perhaps people may assume she said something contrary to her real convictions—i.e. she lied. But other interpretations are more reasonable in this case. Perhaps, she was just sarcastic. Or she tried to be witty. (We leave out the relation of lie to irony, metaphor and sarcasm.)

Let us therefore take an uncontroversial example. A captain and his mate have a long term quarrel. The mate drinks more rum than is good for him, and the captain is determined not to tolerate this behavior any longer. When the mate is drunk again, the captain takes it down into the logbook: *Today, 29th May, the mate is drunk.* When the mate reads this entry during his next watch, he is first getting upset, and then, after short reflection, he writes into the logbook: *Today, 30th May, the captain is sober.*

What to do with such cases? One would definitely say that the Mate was wrong. He lied by falsely implicating, though literally saying the truth. But how to prove this? We need an extended definition of lie. Here is a proposal by Jörg Meibauer ([11]), based upon Falkenberg's paper ([6]):

DEFINITION 3. *A* lied at *t* by uttering the declarative sentence *J* $\overset{\text{df}}{\Longleftrightarrow}$

1. *A* asserted at *t* that *p*,
2. *A* actively believed at *t* that not-*p*,
   or
3. *A* thereby conversationally implicatured that *q* but actively believed that not-*q*.

where

DEFINITION 4. *A* conversationally implicatured at *t* that *q* $\overset{\text{df}}{\Longleftrightarrow}$

1. *A* asserted at *t* that *p*,

2. *A* believes that *q* and wants the addressee *B* to believe that *q*
3. *q* is calculable[3] from the assertion of *p*
4. *q* is cancellable[4]

It seems that these cases can be handled by the above extended definition within a theory of conversational implicature. But the problem is: one may well hesitate to acknowledge that there is such a theory to-day. At least deceptive speech acts conflict the basic Cooperative Principle.

2.2. Who cares for lies?

There is more trouble with lies. Lying is not only a speech act, it is also an act of communication. What's the difference? Well, the focus is different. Speech acts bring about utterances, communication aims at more substantial changes in the world: behavior, acting, cooperation etc. The essence of lying is not its linguistic structure, but the consequences it has for (other) people out there in the world.

To be sure, not only negative consequences matter. The following seems to be perfectly normal communication:

> *Where have you been that long?*
> You know, there was a lot of work to finish in the office.
> *That's a lie! I've called you there. They told me you had left office long ago!*

Should the angry wife better say: "You are not a liar, since I am well informed. But what you told me is plainly false!" That sounds odd under the circumstances. Even assuming that her husbands utterance had no deceiving effect. So the normal usage of lie covers cases of unsuccessful lies as well. This is true under the assumption, however, that there is some effect after all. In the above example, the lady was probably moved by her husbands intention to deceive her. May be she was hurt, or perhaps she was glad to calm own bites of consciousness that way.

So ineffective lies are true lies as well. By the way, otherwise the eight commandment "Thou shall not lie" would be pointless. You can't lie successfully to an omniscient God, can you?

Yes, you can. According to Christian Doctrine, the very intention to deceive somebody makes you a sinner. How can that be? I think the reason

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[3]"Calculable" by means of the Cooperative Principle and the maxims.

[4]"Cancellable" means that it can be defeated by the addition of premises.

lies in the ontological instability of lies. They undergo a kind of metamorphosis in the moment they are discovered. The metamorphosis takes them from intended subjective false information to acts of verbal aggression. Discovering a lie means to realize the false of the received information together with the speakers intention to deceive. Before discovery, the addressee is exposed to false information, thereafter he is offended by a lie. By discovering the lie is neutralized as information—it looses its potential to do damage. But it starts to function as a speech act. In other words, there seems to be a change in ontological character, a switch from uttered information (i.e. speech act) to used speech act (i.e. act of communication). And both stages of the phenomenon have its specific effects: the first causes the addressee of the lie to less than optimal behavior. The second lowers overall confidence and rises transaction costs.

That is what makes the double character of a lie: on discovery it switches from a speech act to an act of communication. But it is always a lie from the liars point of view, since we assume here that he knows his own intention all time. Now due to Gods omniscience, any lie is transformed to stage II immediately. No false information can hurt him (since he knows better), but lies offend him as deceptive acts of communication.

What is the message? It seems that a lie becomes a lie only from the victims perspective. This presupposes that there is no lie without a victim. In my opinion we have an analogy to murder here: There is no manslaughter without a dead human. And similarly, there is no lie without an infringed person. This leaves open the possibility that under very special circumstances the victim might be the liar himself (I have in mind e.g. so-called "Lebenslügen"—although they seem to be really special, indeed).

As I said before, "victim" should not be mistaken for "a person suffering". It is enough that a lie has some inference, positive or negative. Otherwise you would rather call it a white lie, which is no lie at all. If you don't care about it, it is no lie.

All this is certainly bad news for a "logic of lying". You can't bring down a lie to its internal formal structure. And you won't succeed when trying to identify a lie by what was said explicitly, not even when taking into considerations the circumstances. So the only way out seems to search for a solution within a pragmatic theory of communication. The best developed framework so far, the so-called theory of conversational implicature, does not fit these aims: lies are no rational speech acts according to the standard approach. But this can hardly be adequate. All to often deceptive speech

acts are very rational, indeed. So we need something else for analyzing them. The phenomenon of successfully lying by saying something literally true shows, that this won't be easily accomplished.

3. Lying as a Subject of Logic

Given that lying plays in particular an important role in human communication, logic should account for it. Amazingly enough, it does not! The topic is almost completely ignored by traditional logic. In his 1990 analysis of lying Jerzy Pelc ([13]) mentions several "dimensions of truth" necessary for a complete representations of that phenomenon. Our above considerations point towards the same conclusion. Taking this for granted, lying shall be a thorny field for logical investigation.

3.1. The Liar

Sometimes, lies are an explicit subject of logic. The most prominent example here is, doubtless, the Liar. The so-called antinomy of the Liar, or Eubulides' antinomy, is an ancient and respectable topic in logic. The problem is very old, indeed. In its oldest formulation, perhaps, it takes the following shape: A nasty crocodile took away a child playing on the bank of the Nile. Its mother demanded the return of the little one. They agreed upon the following procedure: the woman makes a claim. If and only if this statement is true, the crocodile will return the child. So she states: "You won't give back my child!" "O.K. then"—reasons the crocodile—"if this is true, it means you won't get back your child. But, if it is a lie, then, according to our agreement, you lost it anyway." Obviously, the woman objects: "Not so! If I spoke the truth, you have to return my child. That's what we agreed upon. But in case what I said was a lie, then what actually will happen is that you will give my child back to me!" The quarrel could last quite a while. And in fact it did. Countless variants are known from the literature. One of them even made its way into the Holy Bible.

You all remember the story: St. Paul intended to calm Titus, who went out to Crete in order to convert the locals and bitterly complained about his hard job. St. Paul expressed his sympathy in an Epistle to him:

> For there are many unruly men, vain talkers and deceivers, specially they of the circumscription, whose mouths must be stopped; men who overthrow whole houses teaching things which they ought not, for filthy lurce's sake.

> One of themselves, a prophet of their own, said. Cretans are always
> liars, evil beasts, idle gluttons.

Actually, that was not yet an antinomy, unless we assume that this prophet
was the only inhabitant of the island. But the prominent source boosted the
discussion, which was around at all times. Usually, the Liar paradox was
treated merely as a funny, but not really important logical riddle. There is
only one reported case (see [2]) of an ancient philosopher, Philetas of Kos,
who committed suicide in great despair, being unable to solve the puzzle.

Things changed considerably only much later, when Bertrand Russell
found a way to revive the liar in the realm of (naive) set theory. The set
of all sets which are not an element of its own damaged Gottlob Frege's
project of foundations of arithmetic. But at the same time it gave rise to a
hitherto unprecedented boom in fundamental research in mathematics. In
some sense, that marked the birth of modern mathematical logic as foun-
dations of mathematics. The most powerful project in this evolution was
a programme, initiated by David Hilbert to prove the consistency of math-
ematics once and forever: all branches of modern mathematics were to be
transformed into axiomatic theories and all these theories were to be proven
free of contradictions. Unfortunately, it was again the liar, i.e. the obstruc-
tion that brought out Hilbert's Programme in a sense, which made an end
to it, at least—again—in a sense. The reason was Kurt Gödel's so-called
second theorem:

> Gödel's second incompleteness theorem proves that formal sys-
> tems T satisfying certain conditions "cannot prove their own con-
> sistency", in the sense that a suitable formalization in the lan-
> guage of T of the statement "T is consistent" cannot be proved
> in T. Of course, T has to be in fact consistent, since otherwise
> everything is provable in T.

The second incompleteness theorem applies in particular to those formal
systems that can be used to develop all of the ordinary mathematics that
one finds in textbooks. The decisive point is that such a system has to be rich
enough to include formal arithmetic. Then, by using an ingenious technique,
so-called Gödelization, the system is able to "speak about its own sentences".
Now, Gödel's idea was to investigate a sentence which said "I have no proof".
This, however, is nothing but the arithmetical reincarnation of our old friend.
If it has a proof, then we have a problem. If not, then what it says is true,
and it should have a proof after all, since all true mathematical sentences
should be provable.

That is hard stuff and until now whole new branches of mathematical logic are investigating the scope and—if possible—are taming the consequences of this result. Yet it is not our business to become absorbed in these tendencies, which reach out far into philosophy and theoretical linguistics, for one simple reason: "The Liar" doesn't lie. It needs a very peculiar understanding of lying to subsume the statement "Hoc est falsum" under our theme. So we need not care for it. So much for the most prominent example of lying in logic, namely the Liar.

3.2. Formal Accounts

In classical logic, "to lie" usually just means to contradict the truth. This doesn't simply mean "falsehood", since falsehood may come in various degrees. Already such a simple understanding may result, as we saw, in interesting logical problems. E.g., Raymond Smullyan wrote a very entertaining and instructive book about liars and logic-knights, that leads the reader as far as to Gödels theorems. That kind of consideration found practical application as well. Stanisław Ułam and John von Neumann started investigations of equation systems with a definite number of false equations. The question is: are there algorithms for solving them in spite of this obstruction? Such algorithms may, of course, turn out to be extremely useful for reasoning in databases with partially defective information.

However, the notion of lying assumed in these approaches, is far from any intuitive understanding of this concept. Besides this, there are few attempts to be found in the literature to investigate in greater detail the formal structure of lies or of deceptive utterances. The challenge is to construct a metamathematical counterpart of the concept of lying. What formal means to this end are available in modern logic? I found the following examples.

Alexius von Meinong. Meinong's monograph "On suppositions" ([12]) is an early attempt to give an explication of lie which meets the standards suitable for logical formalization. Meinong himself did not seek for the final logical form of his considerations. This was done only recently by Urszula Żegleń (in: [18]). Let me quote Żegleń's relevant definitions:

$$S_{xy}\alpha \overset{\mathrm{df}}{=} W_x B_y \alpha,$$

$$L_{xy}\alpha \overset{\mathrm{df}}{=} W_x B_y \alpha \wedge \neg B_x \alpha,$$

where $S_{xy}\alpha$ reads "x wants y to believe α", whereas $L_{xy}\alpha$ stands for "x lies to y that α", i.e. x wants y to believe α although x does not believe in α.

In a next step she proposes an implicit, i.e. axiomatic characterization of the predicates involved. Oversimplified as this may seem, it is already sufficient to prove some modest theorems, for instance the following connection:

$$L_{xy}p \ \rightarrow \ W_x B_y B_x p$$

Żegleń ends with a suggestion that the well developed means of epistemic logic might be used to refine Meinong's approach to lying.

Epistemic logic. In fact, epistemic logic is a very promising framework for this purpose. Werner Stelzner (in: [15]) makes use of these means to approach the problem. He assumes the following notion of lie: "Usually, a statement is called a lie, if the speaker internally rejects the sentence which he publicly affirms."

In his notation, Stelzner arrives at the following formula:

$$L(x,p,t,y) \ \stackrel{\mathrm{df}}{=} \ O(x,p,t) \wedge A_{\star}^{a}(x,p,t,y),$$

where

$$O(x,p,t) \ \stackrel{\mathrm{df}}{=} \ \exists q \exists r (A^{i}(x,q,t) \wedge V(x,q,t,r) \wedge V(x,p,t,\neg r))$$

and $V(x,p,t,q)$ stands for "x understands p as q at t."

In the above formulas, t is the time interval when x claims p to y. Therefore $O(x,p,t)$ means that x rejects p at t. Hence, x lies to y about p at t, iff he explicitly states x, though simultaneously he rejects p.

Contrary to this, Klaus Wuttich assumes (in: [19]) a stronger definition of what he calls a "promising lie":

$$L^{e}(x,p,t,y) \ \stackrel{\mathrm{df}}{=} \ K(x,\neg p,t) \wedge A_{\star}^{a}(x,p,t,y)$$

where $K(x,p,t)$ means: x knows p at t. This is because he claims that in order to deceive successfully, one has to know the truth—you can't intentionally show somebody the wrong way without knowing the right one.

Of course, from now on all hinges on the (axiomatic) characterization of the predicators involved. Subsequently, a completely internal logical debate sets on, discussing the formal details of the proposed explication, drawing inferences from it, considering variants and improvements—in other words: here starts the happy business of construction of formal calculi. However, the connections with contextual aspects of lying are fading away rapidly.

Theory of communication. One may hope to make a better strike in speech act theory. This branch is more closely connected with pragmatic aspects of

communication and shall pay better attention to the subtleties of deceptive utterances. Let me take Georg Meggle's work as an example of this kind of research (see e.g. [10]).

Meggle's aim is not exactly to build a calculus of lies, but a very similar one: a calculus of deception (although his logical standards are rather low). As usual, lies turn out to be special forms of deception: a lie is an overt deceptive utterance—overt with respect to the intended result of deception, not with respect to the very act of deception, to be sure. Meggles motivation is perfectly honorable: to improve our capacities of discovering deception by using logical methods of analysis and reasoning.

To get started, he assumes some rather harsh idealizations: a world populated by two persons x and y, who have exactly one of two intentional states: believing (B) and intending (W). At the first level, there are only a handful of elementary states in such a world: from $B(x, p); B(y, p)$ to $\neg B(x, \neg p); \neg B(y, \neg p)$, and for W accordingly. Trouble begins with iteration: if x believes something concerning the beliefs of somebody, then the number of possible cases grows rapidly. This, on the other side, yields a lot of raw material to define more sophisticated concepts. For instance, the intention to deceive is explicated by the following wild predication (B' means "later than B"):

$$W(x, B'(y, p)) \wedge B(x, \neg p)$$

But despite such technical doubts, there remains a hollow feeling while scrutinizing more and more subtle cases of lying and deception: it is not even the rapidly rising number of cases hard that are to re-translate into natural language. After all, exaggerated diversification is quite typical also in philosophical analysis of lying, which all too often comes as unworldly casuistics. The problem lies instead in the technically poor means Meggle decided to work with. Why should a world as abstracted as Meggle's two-person community—moreover persons with pretty poor mental life—show something interesting about our real world and the lies within our real world communication? I cannot help to think about a glass beard game here, entertaining, sophisticated and nice but with no clear implications for real life.

4. Why there is no Logic of Lie so far

Normally, logic is concerned with the truth. Whole bookshelves are stuffed with the most sophisticated investigations in the truth of a sentence, or in the correctness of an inference, i.e. when does it lead from true premises

to true conclusions. Compared with that enormous amount of scientific material, the above overview of explicit logical research on lying doesn't look impressive at all. Amazingly little work has been done on the subject. Why is this?

There are quite a few reasons. We will consider them one by one and disclose further properties of lies at the same time. First of all, any adequate formalization of the concept of lying requires quite powerful logical tools. However, the more powerful a formal language is, i.e. the more details from natural language it can express, the more demanding is the metamathematical apparatus required to control reasoning in the given formal language. Here we have a trade-off which is well known from research in Artificial Intelligence: the trade-off between a comfortable and precise (and therefore usually very sophisticated) language of formalization on the one hand and limited as well as expensive resources for processing the formalized material on the other hand. Sometimes it may pay off to work with a modest but less complicated language which requires little memory and low calculating capacities.

It goes without saying that there was no such decision in former times: simply because there was no appropriate formalizm available at all. But then we face another problem.

> An utterance is a lie only if it brings about a conflict between the verbal representation of some state of affairs and the speakers mental representation of this very state of affairs.

Of course, this is not yet a definition (since there is no "if"–part) and the explication does not seem very clear anyway. What kind of conflict does it point to? Does it mean that the verbal representation is inadequate because it is too narrow—did we say too little? Or is it too broad? You all know the notorious problem with telling the truth, but precisely the truth: all truth and nothing beyond. Or is the inadequacy at the other side: at the side of the mental representation? All of these cases may occur.

4.1. Lies bring about Inconsistencies

That means, if understood in a standard setting, that a lie contradicts the truth.[5] If we perform our formalization in a very simple formal language this may lead to inconsistencies. Nowadays, we have much better technical

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[5]Viewed from another perspective, lies are often intended to calm existing conflicts. One may lie in response to an accusation, to deflect a suspicion, or to "smooth" empirical data

means available. As a result we have the freedom to choose an appropriate formalization, i.e. one in which no such inconsistencies occur. However, as indicated above, there may be a reason to choose a plain and simple formal language after all, and to accept the inconsistencies.

But, the question is: how could we possibly do this? We all know that traditional logic is almost helpless when coping with inconsistencies. The reason is a fundamental principle of logic, called the Law of Excluded Contradiction. Should we be afraid of contradictions? Yes, we certainly should! Actually, the *ex contradictione quodlibet* principle is considered the very keystone of rationality in our cultural tradition. You'd better not rattle the keystones, since the whole beautiful vault may collapse. But it is not only a matter of Western cultural tradition—contradictions indeed indicate a deviation from normality, from the usual standards of rationality. Therefore, it seems perfectly justified to assume the *ex contradictione quodlibet sequitur* principle. This principle leads to an explosion of the system whenever one single contradiction occurs. The *horror contradictionis* is endemic between rational thinkers. Aristotle holds:

> This principle is our only weapon against error and falsehood

—and here we may add: as well as against lies—and he concludes

> The principle that two contradictory statements are not both true is the most certain of all.

Was Aristotle right to damn contradictions? Yes—and no! The notion of contradiction is of iridescent paronymy. Not every inconsistency means that from now on any rational inferences are impossible. Otherwise jurisdiction, for example, would break down immediately. In court hearings, it is quite usual to present extremely inconsistent opinions: at least the accused party may lie as much as it pleases. And yet the judge makes his—more or less consistent—conclusions from what he is told.

Anyhow, Aristotel's opinion has been extremely influential ever since. And yet there is another tradition—suppressed but never fully extinct. This tradition leads from the early Greek philosophers, Parmenides and Heraclitus in particular, through the sophists to Fichte, Hegel, Marx and—nowadays—to post-structural and post-modern approaches. There is a current research hypothesis stating that the sophists were in possession of an alternative formal system which—in opposition to Aristotle's syllogistics—was able to deal

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in scientific research. These matters, however, belong to the realm of moral considerations, which is beyond our topic today.

with inconsistent talk. However, sources are rare and corrupted, and thus any reliable reconstruction of that sophist logic seems very hard to achieve.

Be that as it may, 2.500 years later formal logic has arrived at various calculi which apply to reasoning with inconsistent sets of premises in a controlled way. One possible way to achieve this leads through a revision of the law of excluded contradiction. This was done in detail in [16]. The upshot is a possible way to distinguish Aristotel's law from a similar, but different principle, called *ex falso quodlibet.* For various reasons it seems possible and reasonable to dismiss the *ex falso quodlibet* principle and at the same time to keep Aristotel's *ex contradictione quodlibet* principle.

There are various ways to incorporate this view in logical calculi. As a result, inconsistencies in sets of premises are tamed and reasoning from such sets can be handled in a controlled manner. This class of inconsistency-tolerant calculi, so-called non-adjunctive systems, are special cases of paraconsistent systems. I admit, the name "paraconsistent" is unfortunate, but the issue is a hot and fully acknowledged research topic in modern logic. In any case, the framework of non-adjunctive calculi fits the formal analysis of lying quite comfortably.

4.2. The Crazy Taylor

Until now, we've left out something very important. The missing item hinges on the common sense idea of the duty of logic. What is the role logic has to perform in philosophy and in the sciences? Perhaps the standard answer goes like this: Logic has to distinguish the correct forms of reasoning from unreliable or false patterns of inference. Thereby, logic figures out the logical truth—it establishes the set of tautological formulae. That, however, is not the whole truth. Normally, even the most sophisticated forms of reasoning can be controlled by common sense alone. It is a myth that modern logic is necessary to tell apart the correct conclusion from the incorrect ones. With the possible exception of very few examples from formal ontology—e.g., some proofs of the existence of God—all scientific reasoning can be performed perfectly well without the huge apparatus of modern logic. Controlling inferences is simply not the main task logic has to perform. The main task rather consists, instead, in conceptual analysis and construction. Logic is largely the art of definition. It provides and sharpens the raw material for subsequent construction of logical calculi. In other words: it explicates the basic concepts of the realm under consideration.

Let us look again at the material collected in the literature and evaluate it from this point of view. The resulting impression is even more frustrating then it was the first time. All the approaches proposed so far are far removed from the subtlety and sophistication of the linguistic material they set out to investigate.

In order to perform a logical analysis of any linguistic or philosophical entity, it shall be given a precise form first. Yet, needless to say, this precise concept should stay as close as possible to the natural-language concept that we intend to analyze. There is absolutely no point in gambling with artificial formal constructs that share nothing but the name with its natural-language originals. This, however, is what the working logician does all too often. And this is what makes Stanisław Lem call him a "crazy tailor".[6]

4.3. The Role of Background Knowledge

Whether a statement is a lie or not depends on your background knowledge. To be more precise: a statement is a lie or not with respect to some knowledge basis. I agree with Stelzner that a lie is a multi-place relation. But I think a quadrupel is insufficient—we need a pentupel: a speaker, a listener, a statement, a knowledge basis and a temporal variable. Perhaps one could merge the last two positions into an updated knowledge basis.

What explicitly include a knowledge basis? It may be the poverty of your knowledge that make you fall victim to liars. For example, it is very easy to lie to young children. They just don't know enough about the world—their realm of possibility is not easily crossed. I remember a quarrel with my three-years-old son about bedtime. He wanted me to check my watch to see whether it was already time for him to be asleep. Unfortunately, I didn't have my watch with me. That made him curious about where the watch

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[6]In his witty essay "Szaleństwo z metodą" Stanisław Lem narrates about a tailor. This tailor does not know anything about people, animals, or the world. He does not care about these things—he makes clothes. They look quite unusual: small or large, elastic or stiff, having no holes at all or any number of tubes, which he calls "sleeves" and "pants", consisting of various pieces. If he finishes a dress, he takes it into a large storehouse. Already there are suits that might fit a man or a horse or a tree, clothes for dinosaurs, unicorns, mermaids or beings unknown to anybody on earth. Everyone must confess, Lem claims, that the work of this tailor is sheer madness. – One might well have a more charitable attitude towards the work of a mathematician or a logician than the one revealed by Lem. In any case, the "crazy tailor" makes logical entities we can immediately work with. His obvious disadvantage, however, is that it is impossible to find out the proper formalization by logical means alone. (cf. [8], pp. 145)

might be. Carelessly, I joked that the watch had been very busy that day and hadn't made its way back to my wrist. That was of course a perfect opportunity to divert my attention and the immediate follow-up question was: "Tell me what the watch was doing all day!" I told him a bunch of wild falsehoods about what it was doing: It watched TV, then it went to the store for a new wristband and right now it's sitting in the bathtub brushing its teeth. But now he caught me: "That's not true! It wouldn't do that in the bathtub." The story touched a part of reality he was informed about. Every evening he had to leave the bathtub before brushing his teeth and he never saw anybody doing otherwise. So this relatively mild lie was the one he recognized against the background of his specific world-view: it contradicted other information stored in his knowledge basis. But as a matter of fact, he did not realize the preceding falsehoods, because there wasn't enough relevant information available.

Often enough, it happens to be the other way around. You may take a true statement for a lie because of your insufficient knowledge. To give an example, you may remember one scene from the famous movie "Chinatown". A detective asked a suspicious lady about a young girl he had seen in her company and she answered: "That was my sister!" He didn't believe her. So she told him: "She is my daughter". He took that for a lie, too. So she kept explaining: "She's my sister, my daughter, my sister, my daughter, . . . " making him really upset. But—contrary to his conviction—it wasn't a lie. He simply didn't understand the message. The woman had been raped by her father and gave birth to a daughter who consequently was her younger sister. The detective's knowledge basis—or: the available part of his knowledge basis—wasn't broad enough to let him grasp this fact. Therefore he mistook the true answer for a lie.

4.4. Flic-flac Lies

Sometimes the matter is even more complicated. It may switch back and forth between truth and falsehood, according to an expanding knowledge basis. Imagine a mathematician telling you that yesterday, after great effort, he succeeded in squaring a circle by ruler and a pair of compasses alone. Now, if you have a very poor understanding of mathematics, then it will probably seem to you that the guy is just kidding: how could he possibly square a circle? After all, a circle is round and a square has edges. There is no such thing as a round square. So one thing is sure: you can't square a circle. But, knowing a little bit more about mathematics you understand

the real content of what was going on: he was telling you that he solved the problem of squaring the circle, i.e. he succeeded in constructing a square with the same area as a given circle using ruler and compasses alone. Now your reaction is quite different: you are not longer annoyed by this apparently silly lie, but you congratulate him! For all you know, this is a great result. The Greeks sought a solution to it and so did all the mathematicians for the next two-thousand years. So it is a big thing—and he finally did it! Yet perhaps you may have an even larger knowledge of mathematics. Namely, you may know about Carl Louis Ferdinand von Lindemann's 1882 result saying that Π is transcendental (that is, Π is not the root of any algebraic equation with rational coefficients), from which it follows that the ancient problem of circle squaring is unsolvable. And since the guy is a mathematician, he must know this. So what he did was shamelessly lie to you. Therefore we have a silly lie switching into a very distinguished mathematical statement and back to a shameless lie again. It all depends on your mathematical education.

What is the upshot of these examples? It seems that an adequate formal counterpart of the concept of lying shall include—among other things—the notion of a knowledge basis. That's hard stuff for logical formalization. There are many results available from a branch of logic called knowledge revision. Nevertheless, all sorts of background information, world-knowledge and so on are subject to very serious formal and philosophical obstacles. The best known is perhaps the notorious frame-problem.

4.5. A Lie is what really hurts Me

A lie must be told on purpose. On some purpose. I don't want to go deeper here, since there might be very different intentions behind a lie, indeed. Usually we assume some aim the liar wants to achieve, either personally or because of some group interest. But there is plenty of other motives: perhaps one enjoys the feeling derived from successfully deceiving others, takes an extreme misanthropic stance, is conducting field research or has taken a vow to never tell the truth again. These all are good reasons to lie.

Yet even if we eliminate this difficulty, our troubles do not end. In fact, things are even worse. Somewhere I found the aphorism, "What counts as a lie is decided by the victim". That seems very reasonable, too. For an utterance to be a lie it shall be credited the potential to hurt. This is certainly less then a rigid criterion, again. Kant and Augustinus, on the one hand, will feel offended by any utterance they recognize as an intentional falsehood. A loving mother, on the other hand, will hardly find any lie at all

in the tales of her dear child. And in between there is a plethora of nuances. Nevertheless, if there is no emotional reaction whatever to some falsehood we are told, then I would hesitate to call it a lie. A message that did not cause the even mildest reaction, the slightest change in my attention, could not have been a lie.

In other words, for an utterance to be a lie there must be a reasonable chance for having some negative effects. That means, we have to assume one more hidden indexical and of course the kind of vagueness of the concept follows therefrom: a given utterance may be classified—even under fixed conditions—as a lie by one person and not classified as such by her neighbor.

Furthermore, it may simply depend on my expectations whether or not something will really hurt me. But if this is true, then any explication of this concept requires quite a few facts about causal dependencies and subjective expectation in order to qualify statements under given circumstances as lies. These topics, however, are very inconvenient objects of logical formalization again.

Closely connected problems result from temporal factors of lies. Can a projective utterance be called a lie? "I will never leave you!" Consider a famous example: St. Peter swears to his Lord. Soon after he has betrayed him three times (though under the circumstances, it would be interesting to know who was morally responsible). In my opinion, only under very special conditions can promises denoting future events be true or false now. Sentences with uncertain logical status, however, can't be components of a lie. Consequently, and deviating from usual talk, we shall admit that— normally—a braggart is not a liar. In order to make this precise, we need tools to handle temporal aspects in the background logic.

But the above suppositions have consequences for the extrapolation of the intuitive notion of lying as well. If true, it may well be the case that there is no such thing as a general concept of lying. This wouldn't be an outrageous result. Quite the same holds for such central concepts as causality, law, or duty. There is a standard way out in such a situation: one should split up the concept and start with the easy cases. So we might investigate the notion of a lie in special forms of standardized communication, e.g. in scientific discourse, legal context, or maybe even more specifically in criminal law and in civil law taken separately. What is more, there is no reason to exclude the possibility that an utterance may be a lie to some degree only. If the concept of lying turns out to be a comparative one, then—from the point of view of logical analysis—things are even worse.

5. The End

To sum up the above review of hindrances for an adequate formal analysis of lies we put together the main points.

- lies produce inconsistencies;
- whether an utterance is a lie or not heavily depends on context;
- according to background knowledge there may occur a flic-flac-effect;
- causal and intentional aspects are indispensable in an analysis of lies.

To be sure, all these topics are handled by modern logic. And yet, to merge them into one formal framework, which remains practically feasible seems hard enough. So it is not surprising that a satisfactory logic of lying is still to come.

As cold comfort, let me end with a little poem by one of the most underestimated German philosophical thinkers. It shows another aspect of our topic, which seems pretty remarkable, at least from my perspective. In my humble translation[7] Wilhelm Busch's pretty verse sounds like this:

> If all things would remain
> what we—in lust and pain—
> have to each other said;
> if lies turned into hairs,
> we would be rough as bears
> and see not one bald head.

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[7]I fact, it was Scott Thompson who saved the rhythm of the verse. And he did a lot of god to the rest of the paper.

Several of its parts comprise a thoroughly revised version of a talk given at the International Conference and Master Course *Cultures of Lying*, University of Regensburg, September 30th–October 2nd, 2002.

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