

***Behavioral Implicit Communication;  
its role in the origin of communication  
Its modelling in artificial agents***

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I will analyze

*unconventional*  
*(unspecialized)*  
*behavioral*  
*implicit communication (BIC)*

because my claim is that

**BIC is the most *basic* form of communication**

from the analytical point of view,

and also

**the most *primitive***

**(both in evolutionary and in developmental sense).**

***BIC plays an irreplaceable and underestimated role  
in human interaction and coordination, social order, cultural  
transmission.***

To define BIC making clear

- the fundamental **distinction between *signification* and *communication***
- why it is **false** that all behaviors in social contexts are communication;
- why BIC has **nothing to do with ‘gestures’ and ‘expressive’** movements (the so called *Non-Verbal-Communication*);
- the ‘transition’ **steps** from non-communicative behavior to intentional BIC;
- a few examples of how crucial BIC is in human coordination and collective intentionality and action.

# WHAT Behavioral Implicit Communication (*BIC*) IS

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- Definition
- What is not
- Stigmergy
- Examples

## **Against Watclawicz: *Damned to communicate?***

A famous thesis of Palo Alto psychotherapy school was that

***"It is impossible do not communicate",***

***"Any behaviour is communication"*** in social domain.

In this view, a non-communicative behaviour is a nonsense.

This claim is too strong. It gives us a notion of communication that is useless because is non-discriminative.

- When behavior is communication and when is not.
- Is simple understanding already communication?

**In order to have communication having a "recipient" which attributes some meaning to a certain sign is a non-sufficient condition.**

# Signification vs. Communication

- *We cannot consider as communication any information, any sign arriving from A to B, unless it is aimed at informing B.*

A teleological (intentional or functional) "sending" action by the source is needed.

The source has to perform a given behaviour "**in order**" the other agent interprets it in a certain way, receives the "message" and its meaning.

**Is an escaping prey “communicating” to its predator/enemy its position and move?**

Watzlawich’s overgeneralization cannot avoid considering *communication* to the enemy the fact that a predator can observe the movement of the prey.

**Although this information is certainly very relevant and informative for the enemy or predator, it is not communication.**

Receiving the information is functional (adaptive) for the predator and for that species which have developed such ability, but it is not functional at all, it isn’t adaptive for the prey:

**“Sending” that sign is not a functional (evolutionary) goal of the prey.**

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**Is a pilferer informing or communicating to the guard about his presence and moves?**

**Are killer’s traces (very meaningful *signs* for the police)**

***messages* to it?**

“**Signification**” – following (Eco, 1976)

- prints on the ground are *signs* for the hunter of the passage of a deer
- smoke is the *sign* of a fire,
- some spots can mean "it is raining" (they are for *Y signs* of the fact that it is raining);

We have here **simple processes of *signification***.

Notice that meanings are not conventional but simply based upon natural perceptual experience and inference.

Notice also that the signal, the vehicle has not been manufactured on purpose for conveying this meaning, it doesn't need to be “encoded” and “decoded” via some conventional artificial rule.



1. **Observation**, and more specifically ‘**signification**’  
(the capability to interpret and ascribe meaning to  
observed facts)  
is the basis of a very crucial form of **Communication** without  
words or special protocols.

>>> **Before and without ‘Speech Acts’**

2. *Efficient **coordination** exploits not just ‘observation’ but more precisely this form of silent communication:*

when **Agent X** relies on the fact that **Agent Y** is observing  
**her in order to let Y understand that p**, i.e. for  
*communicating to Y that p.*

# Behavioral Implicit Communication Theory

Usual, practical, even non-social behaviors contextually used as messages for communicating.

- Behavior can be communication **without any modification or any additional signal or mark.**

I will call this form of communication without specialized symbols:

“**Behavioral**” because it is just simple non-codified behavior.

“**Implicit**” because – not being specialized and codified – its communicative character is non-market, undisclosed, non-manifest, and thus deniable;

**Normally communication actions are special and specialized behaviors** (like speech acts, gestures, signals, ...).

# 1. Behavioral Implicit Communication Theory

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## The «goal» of communicating

the crucial component for the notion of communication is the *finalistic* nature of the act of «sending» the message ascribing intentions and mental states to any animal (like insects)? however,

we want to coherently use the notion of animal *communication*.

## Goal-Governed vs. Goal-Oriented Agents

### *Intentions* vs. *Functions*

Two kinds of goal-oriented systems and behaviors,

- **the cognitive, intentional ones (goal-governed),**
- **the merely goal-oriented ones**

without any internal anticipatory representation of the goal of the action, where the *teleonomic* character of the behavior is merely in its adaptive function.

**The finalistic notion we need has two different meanings**

# 1. Behavioral Implicit Communication Theory

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Thus, we have two basic kind of communication:

**Intentional** (or better "goal-governed") communication and  
**Functional** (or "merely goal-oriented") communication.

## **FUNCTIONAL BIC**

with several sub-type: by evolution-selection; or by design; or by reinforcement learning based on the effects (conditioned BIC)

## **INTENTIONAL BIC**

**Intentional BIC usually presupposes an intentional stance and more precisely a «theory of mind» not only in the sender but also in the interpreter, since the message bring by the action can be about the mind of the source: his intention, or emotion, or motives, or assumptions, etc.**

# 1. Behavioral Implicit Communication Theory

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The **definition of BIC** (at the intentional level) is as follows:

*in BIC the agent (source) is performing a usual practical action  $\beta$ , but he also knows and lets or makes the other agent (addressee) to observe and understand such a behavior, i.e. to capture some meaning  $\mu$  from that «message», because this is part of his (motivating or non motivating) goals in performing  $\beta$ .*

«A practical action primarily aimed to reach a practical goal which can *also* lead to achieve a communicative goal, **without** any **predetermined (conventional or innate), specialized** meaning».

## Why BIC is *not*

### «non-verbal», «extra-linguistic» communication

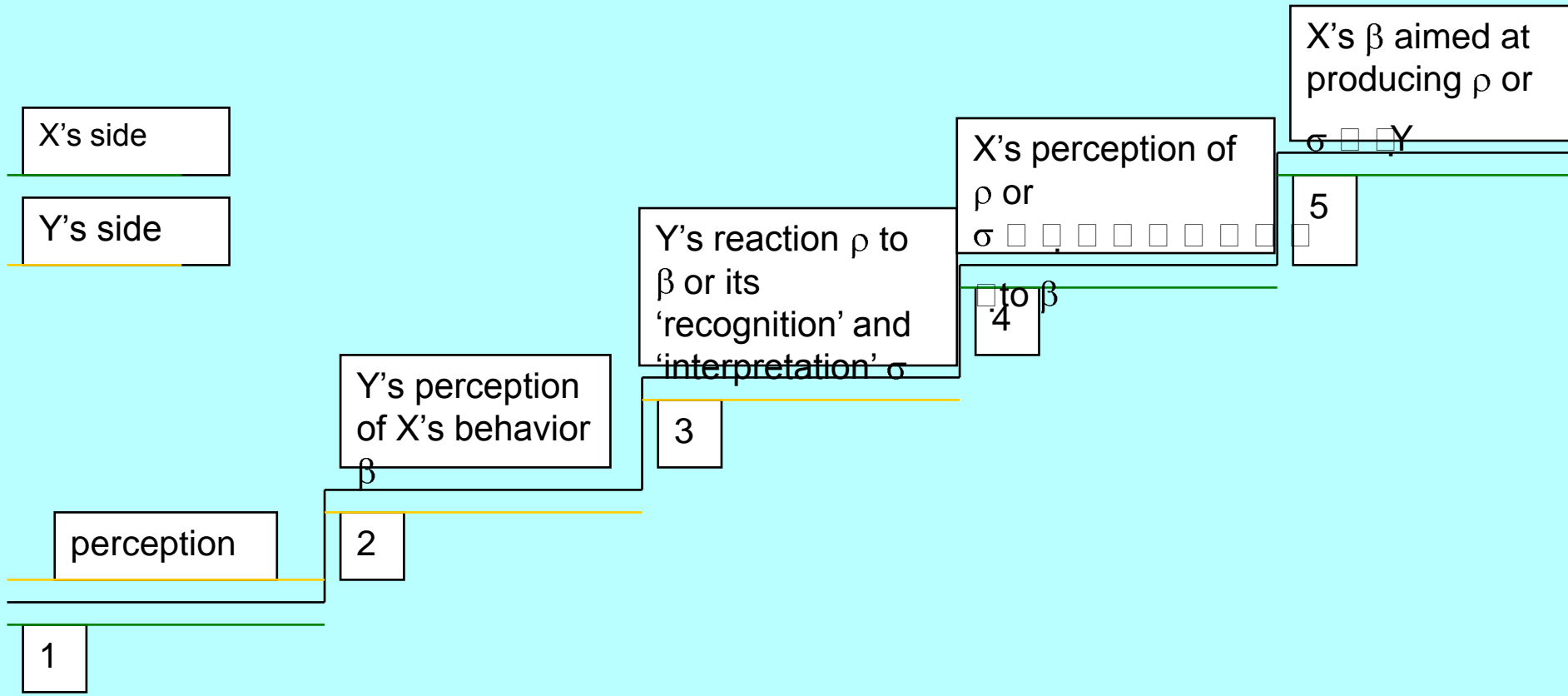
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BIC is not a «language». Any (verbal or non-verbal) «language» has some sort of «lexicon» i.e. a list of (learned or inborn) perceptual patterns *specialized as «signs»*:

where «specialized» means **either conventional and learned as sign**, or built in, designed for such a purpose (function) by natural selection, or engineering. BIC does not require a specific learning or training, or transmission; it simply exploits perceptual patterns of usual behavior and their recognition. .

BIC gestures are just gestures, acts, they are **not symbolic but practical**: *to drink, to walk, to close the door, to scratch oneself, to chew.*

They represent and mean themselves and what is *unconventionally* inferable from them.



# Steps from *Observation* to *Communication*

0. **No Communication at all**; simply exposure and observation with interpretation activity by the observer (*'signification'*).
1. **The weakest form of BIC**:  
the agent is *not acting in order to let the other understand what she is doing*; she is simply aware of this possible result of her behaviour and lets it happen. No real intention, the communicative result is just a known (not desired) effect of the action.
2. **Side BIC**:  
The agent anticipates that the action will have also a communicative meaning (additional result) and she likes this (it is a goal of her), but his action is *not aimed* to reach this communicative goal; **not motivated by it**. The expected side-effects that I let happen is a goal but neither necessary nor sufficient for my action.





# examples

- **The nurse and the patient**

- **To wear your gift**

- **“I’m still working”**

# **BASIC MESSAGES:**

- **I'm able to..**
- **This is how to do..**
- **I have the intention to...**
- **I have done it**
- **.....**

# DIFFERENT MEANINGS/MESSAGES

## “I’m able” or “I’m willing”

The most frequent message sent by a normal behavior is very obvious (inferentially very simple, given an intentional stance in the addressee) but incredibly relevant:

*(as you can see) I’m able to do, and/or I’m willing to do; since I actually did it (I’m doing it) and on purpose.*

## Skills demonstration in learning, examines, and tests

When A is **teaching** something to B **via examples** and observes B’s behavior or product to see whether B has learned or not, then *B’s performance is not only aimed at producing a given practical result but is (also or mainly) aimed at showing the acquired abilities to A.*

This is true for any “examine” and “text”:

>> **any behavior or product under examination is a BIC.**

NB. **Also the behavior of the teacher** is a BIC; its message is: “look, this is how you should do”. Usually this is also joined with expressive faces and gestures (and with words) but this is not the message I’m focusing on.

# DIFFERENT MEANINGS/MESSAGES

## Showing, Exhibiting and Demonstrating

If showing and exhibiting are intentional acts they are always communication acts: ex.

**Mafia's "warning", monition.** The act (say: burning, biting, destroying, killing) is a true act and the harm is a very true harm, but the real aim of this behavior (burning, killing, etc.) is communicative.

The practical act is a *show down* of power and intentions; a "message" to be "understood".

The message is "if you do not learn, if you will do this again, I will do even worst".

# DIFFERENT MEANINGS/MESSAGES

## “ I did it”

- Psychiatric patient *shows* to the nurse that he is drinking his drug
- My secretary leaves the letter on my desk: “Done!”

**The satisfaction of social commitments and obligations (see later)**

## 4. meta-BIC:

In meta-BIC, there is **meta-communication**, typical of higher forms of communication like language.

BIC meta-message is as follows:

*"this is communication, this is a message not just behavior; it is aimed at informing you".*

Frequently BIC has such a high level (Grice's way) nature.

For example the act of giving or handing is not only a practical one, but is a meta-communicative act where X intends that Y understands that she is putting something closer to Y *in order* Y (understanding that she intends so) takes it.

## 5. Beyond BIC:

The last step is when

**the behavior is performed *only* for communication and loses its practical purpose** (or even the practical effect).

In the last case, the act either is

- just faked (**simulation**, bluff) (which is very important in conflict coordination), or
- it is just a **ritual**, i.e. the action has fully become Non Verbal Communication or a conventional symbolic 'gesture' with a practical origin.



# STIGMERGY

***stigmergy*** is communication via long term *traces*, physical *practical* outcomes (*objects*), *useful* environment modifications, not mere signals.

**Stigmergy is just a sub-case of BIC,**

since in fact any BIC is based on the perception of an action that necessarily means the perception of some “trace” of that action in the environment (for example air vibrations).

# STIGMERGY

**Stigmergy is not only for insects, birds, or non-cognitive agents.**

There are very close examples also in human behavior.

**In animal stigmergy is non intentional, but intentional forms of it are possible.**

Consider

- a sergeant that – while crossing a mined ground –says to his soldiers: **“walk on my prints!”**. From that very moment any print is a mere consequence of a step, plus a stigmergic message to the followers (descriptive “here I put my foot” and imperative “put your foot here!”).

Human merely **‘functional’ forms**: *ex.bitten paths*

# Stigmergy in humans:

some nice example with **deontic** components

## Leaving the coat on the seat

“already taken, not free”. This is a *sign*, deliberately used for meaning (signalling) this. It's communication.

## Parking marks

**They are not merely messages**; in fact, they cannot be replaced by a simple poster illustrating the prescribed car disposition in that street.

**They also have the practical function of visual reference point in the manoeuvre to be used during the act of parking.**

# ***BIC* and Social Order**

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- **BIC and *coordination***
- **BIC and *implicit agreement***
- **BIC and *conventions***
- **BIC and *normative behavior***
- **BIC and *'Count As' Actions***

# **BIC & Mind Reading**

Behavioral Communication is fundamental for Mind Reading,  
the basis of human social interaction

**We read Mind mainly by reading behavior in  
mental terms (beliefs, goals,..)**

**When I realize that you read my behavior  
I do so on purpose (behavioral communication): in order to  
coordinate, to cooperate with you, or to deceive you**

**NO real/effective COLLABORATION**  
**without**  
**UNDERSTANDING**  
**the GOAL of the other**  
**and (more precisely) ‘adopting’ the goal**  
**of the other**

# Goal-ADOPTION

*“Y has the Goal G1 since and until it is the Goal of X”*

is NOT ‘IMITATION’

is not “doing the same”, “doing like the other”

It is **doing something ‘for’ the other,**  
for realizing her Goal

OR

It is **sharing a goal with the other,**  
for realizing a common Goal

# HOW DO GROUPS **COORDINATE** THEIR COLLECTIVE ACTIVITY?

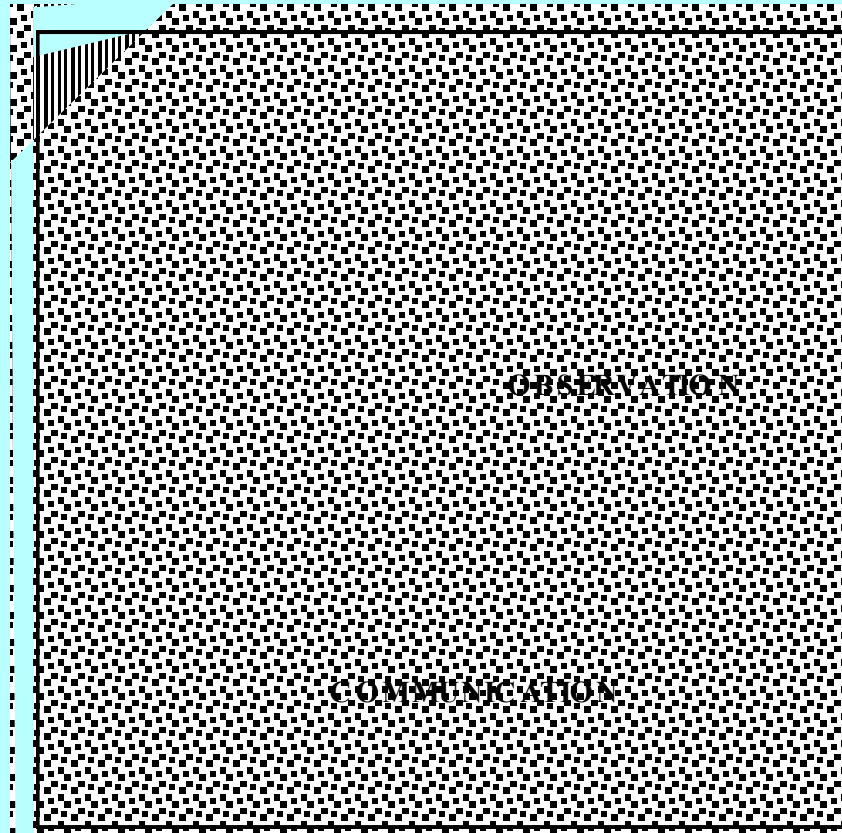
Mainly by exploiting mutual observation, behavior interpretation, and outcomes and traces: that is

***by sending behavioral and stigmergic messages***

Ex. Soccer



# BIC-based coordination:ex. **playing soccer**



**BIC actions + Stigmergic Communication** Through the Ball



## **MOVEMENTS + NOICE**

# HOW DO GROUPS ESTABLISH THEIR "AGREEMENT" ?

Groups (in strict sense) and group activities are based on members' **agreement**

However, such an agreement and commitment is rarely achieved by an 'explicit' negotiation and communication (Scanlon).

Usually the real mechanism is a 'tacit consensus' but

- **HOW TO ACHIEVE A CONSENSUS 'TACITLY'?!**
- **HOW CAN WE KNOW THAT THERE IS A CONSENSUS?**

The answer is

**via BIC:**

**when doing or not doing is**

**communicating**

# Obeying Norms as BIC

One of the functions of norm obedience is **the confirmation of the norm itself, of the normative authority** of the group, and of conformity in general (E. Posner; Conte)

- thus one of the functions of norm obeying behaviours is that of informing the others about norm obedience.

x is worrying about social monitoring and sanctions or seeking for social approval, and he *wants the others see and realize that he is obeying the norms.*

Of course, X can also *simulate* his respect of the norms

# Imitation-BIC as convention establishment and *memetic* agreement

Imitation (i.e. repeating the observed behavior of Y – *the model*)  
has several possible BIC valences

Communicative goals:

- a) In **learning-teaching via imitation**. X communicate to Y “I’m trying to do like you; check it: it is correct”
- b) In **convention establishment and propagation**. “I use the same behavior as you, I *accept* (and spread) it as convention; I *conform* to it”.
- c) In imitation as emulation and **identification**: “I want to be and to behave like you”
- d) In imitation as **membership**: “I want to be and to behave like you; since I’m one of you”. “We are different from the others; we behave/speak in our own way”



# BIC Communication

## necessary for “Joint Attention”

Tomasello. Not just *accidentally converging attention* of X and Y on Obj.  
Also the common awareness of this is needed.

**They must ‘signal’ to the other that they put attention on Obj and they must ‘signal’ that they know that the other puts attention to Obj**  
etc....

In fact,

- they put attention to Obj also because and in order the other puts attention to Obj;
- they ‘cooperate’ on this and must coordinate and motivate each other by this message.

# BIC Communication

## necessary for “Joint Attention”

Mutual RECOGNITION must be signaled to be effective

Gilbert: “Some **communication** is needed”

Calabi: “participants must **show** each other...”,

“...common knowledge of a **mutually expressed** attitude...”

- X’s looking at Obj is a **message** to Y: “I’m looking at Obj (like you/ as you want)”; “look at Obj!”.
- X looking at Y’s looking at Obj is a **message** to Y: “I know that you are looking at Obj; I’m checking if you are looking at Obj”.



# ***BIC* and Language**

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- ***BIC and the Origin of Gestures and Language***
- ***BIC and the origin of meta-communication in Language***
- ***BIC and linguistic 'implicatures'***
- ***BIC and Meaning & Linguistic Rules Negotiation***

# BIC and LANGUAGE

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## BIC and the origin of meta-communication in Language

If «Saying is Doing», since «Doing is Saying» = Saying<sup>2</sup>

1. Any correct use of a specialized semiotic means, i.e. *shared codified communication system* (SCCS), entails Y's (the observer/addressee) possible **recognition** of the fact that X (the sender) is communicating and intends to communicate.

Thus:

2. X can predict and intend this effect and can use SCCS and her act also **in order** Y comprehends that X intends to communicate:

*there is a potential BIC meta-message («This is a message», «I'm communicating») in any use of a SCCS.*

# BIC and the Origin of Communication and Language:

## Hypotheses

### 1. Communication before Language (Lapalisse):

*The Origin of Communication (also of an open-ended communication, not inborn) is antecedent to the Origin of any Language 'from hands to mouth'*

Although completely obvious this possibility is ignored in several theories and discussions (see for ex. <http://www.interdisciplines.org/coevolution>)

1(a) *BIC might play an important role in communication and language genesis, both at the phylogenetic and ontogenetic level.*

1(b) *The first form of learned/constructed communication in humans is BIC*

ACTION → before → BIC → before → CONVENTIONAL-COMM → before → LANGUAGE

1 (c) *A very significant step in origin of language has been the passage from non-intentional (although finalistic) forms of communication to intentional communication.*

*this crucial transition happens /takes place with BIC*

BIC provides an **open** sign-system but not based on a productive combination of meaningful units.

In other words, in our view

1 (d) *BIC has been the first form of intentional communication*

Is **Intention** in communicative behavior due to **Imitation** and Pantomime?  
(Arbib)

Not only!

**Intention already emerges in BIC**: in the evolution of 'grasping' and 'pointing' when X discovers that Y's recognizes her goal and appropriately reacts (Vygostkij; Bates; Bruner; ecc.);

after this **X performs the action in order** to elicit Y's recognition and reaction

**This thesis presupposes that one does not mix up BIC and Non Verbal Communication**

# BIC before Gestures

**3(a) *Before many gestures there is an action; more precisely many (all?) gestures derives from actions***

(historically, phylogenetically, and ontogenetically).

However, this is only at the ideal level, since the process is 'disturbed' by the effect of a pre-existing culture and language of gestures that is learned by the child (see later). (See Volterra's group; Berglund; ...)

**More precisely**

**3(b) *Before gestures there are not simply actions but communicative actions (BIC)***

**> BIC is the mediation step between Action and Gesture**



# **BIC basement of Social Order & Interaction**

***If there is a 'Social Contract' at the basement of  
society  
it has been established via BIC  
and is just tacitly signed and renewed***

# Artificial autonomous Agents

- **HRI from Observation to Communication**
- **H-Agent interaction**
- **Agents' traces and coordination**



**Agents lacking the capacity for mind-reading, intention/plan recognition, beliefs and intentions about the other's mental states**

**will never be capable of this fundamental form of communication and will be confined to more primitive BIC forms just based on evolutionary selection or reinforcement learning and reactive behaviors.**

**I should remain silent  
sending you a BIC-  
message:  
*“I have finished”***

**to remain silent might BIC-  
mean:**

*“I have finished”*

**but I prefer an explicit  
message:**

**to remain silent might BIC-  
mean:**

*“I have finished”*

**but I prefer an explicit  
message:**

**the**

**END**

**GRAZIE!!!**

# ***BIC and ToM***

4

With a BIC message X has not necessarily the *intention* that the other realizes her higher-*intention* that Y understand this, that is her *intention to communicate* something to Y through that practical action

Clear how **intentional BIC is bilaterally – that is on both sides – based on ToM:**

First, **it presupposes Y's ability of 'reading' X's behavior;** the most primitive level is the mere recognition of the movement, a more advanced level is **the recognition of the 'goal' of the action.** Mirror neurons seem able to provide this faculty to primates (Rizzolatti et al., 1996; 2001; Arbib, 2003).

More advanced forms entail **the recognition of the higher intentions, motives, and beliefs of the agent.** In other words BIC presupposes that Y has a representation of X's mind.

Second, BIC presupposes  
that **X realizes Y's understanding of her goals or intentions and beliefs;**  
that is that Y's has a theory of X's mind;  
and this implies X's representation of Y's mind

## Reciprocal ToM between BIC-sender and receiver

Let us now focus on the relationships between *intentional* BIC and ToM as emerged from this analysis.

**i<sub>a</sub>**. X's goal in sending the BIC message is that Y believes that X is doing action  $\alpha$ ; but action  $\alpha$  frequently enough is conceptually defined/characterized in an intentional way, that is by its purposive result (for example 'water' is not just dropping water on plants); moreover, X frequently intends that Y understands what X has in mind while doing  $\alpha$ : her beliefs or goals.

**ii<sub>a</sub>**. X assumes that Y does not already knows/believes the content of the message, and if the message is an 'imperative' does not already intend to do that action.

**iii<sub>a</sub>**. in Meta-BIC X also plans that Y realizes that X *intends* to communicate and that Y understands the message.



Thus X has (and bases her message on) a rather complex ToM of Y, even a recursive one: “X wants/believes that Y believes that X wants/believes....”

On the side of the addressee, we have:

**i<sub>b</sub>**. Y (even *before* BIC and as one of the conditions for its evolution) interprets X’ s behavior in mental terms: as due to given beliefs and goals. He reacts to these goals, intentions, and beliefs of X more than to X’ s actual behavior, especially for anticipatory coordination.

**ii<sub>b</sub>**. Y is able to contextually interpret X’ s behavior as a *message*, i.e. as intentionally aimed at changing his own mental states (“X believes that I believe..... X intends that I believe.....”).

Not only in and for BIC communication we have ToM on both sides, but we also have goals about the mind of the other and we arrive to cooperation on such goals. We may consider that in BIC there are two goals/functions meeting each other:

As we know, very frequently the information content of the BIC message is about the sender's internal attributes, like skills, but also like mental attitudes. The BIC message can be aimed at informing Y about X's intentions or beliefs: "I'm going" "To me it is cold here, this is why I have closed the windows" "This is how I want that you do this job", etc.

Not only this message presupposes the capability for some ToM in the receiver, but it requires the sender's capability of representing the receiver's representation of his mind: X believes and intends that Y is able to believe that X believes... This is the second step.

Notice that this step is presupposed by the possibility of communicating about the intention to communicate: the latter is just a specific case of the former, and we claim that this also comes later.

***The capability of informing about X's intentions (in practical actions) comes before and is a preliminary requirement of the capability of informing about the intention of informing.***

In BIC there are two goals/functions:

**i) the communicator's goal:** X behavior has the goal or function that Y "understands", recognises, comes to believe that p

**ii) the interpreter's goal:** Y has the goal/function of interpreting X's behavior in order to give it a meaning

However those goals in the previous forms of BIC are **independent** from one the other.

**"Cooperation" is accidental; They do not really have a "common goal"**

Since Y does not know that X is communicating to him through it behavior  $\beta$ , he has not the goal of:

**"understanding what X means by  $\beta$ ";**

the real **common goal** of higher form of communication (like linguistic communication) on which usually X and Y cooperate for a successful communication (Meijers).

Also in **meta-BIC** (without specialised messages) the agent **cooperate**, and the two goals (i and ii) are complementary, convergent and functional one to the other.

Given the BIC **META-MESSAGE**:

***"this is communication, this is a message not just behavior; it is aimed at informing you".***

y knows that x is communicating. Therefore he has a special form of goal (ii), the goal of caching what x is *communicating*

**iib:** goal y to understand what x's intends to communicate, to understand which is the meaning in x's mind.



# “Qui Tacet Consentire Videtur”

## *Tacit Agreements in Conventions*

### *Inaction and implicit communication in **tacit consent***

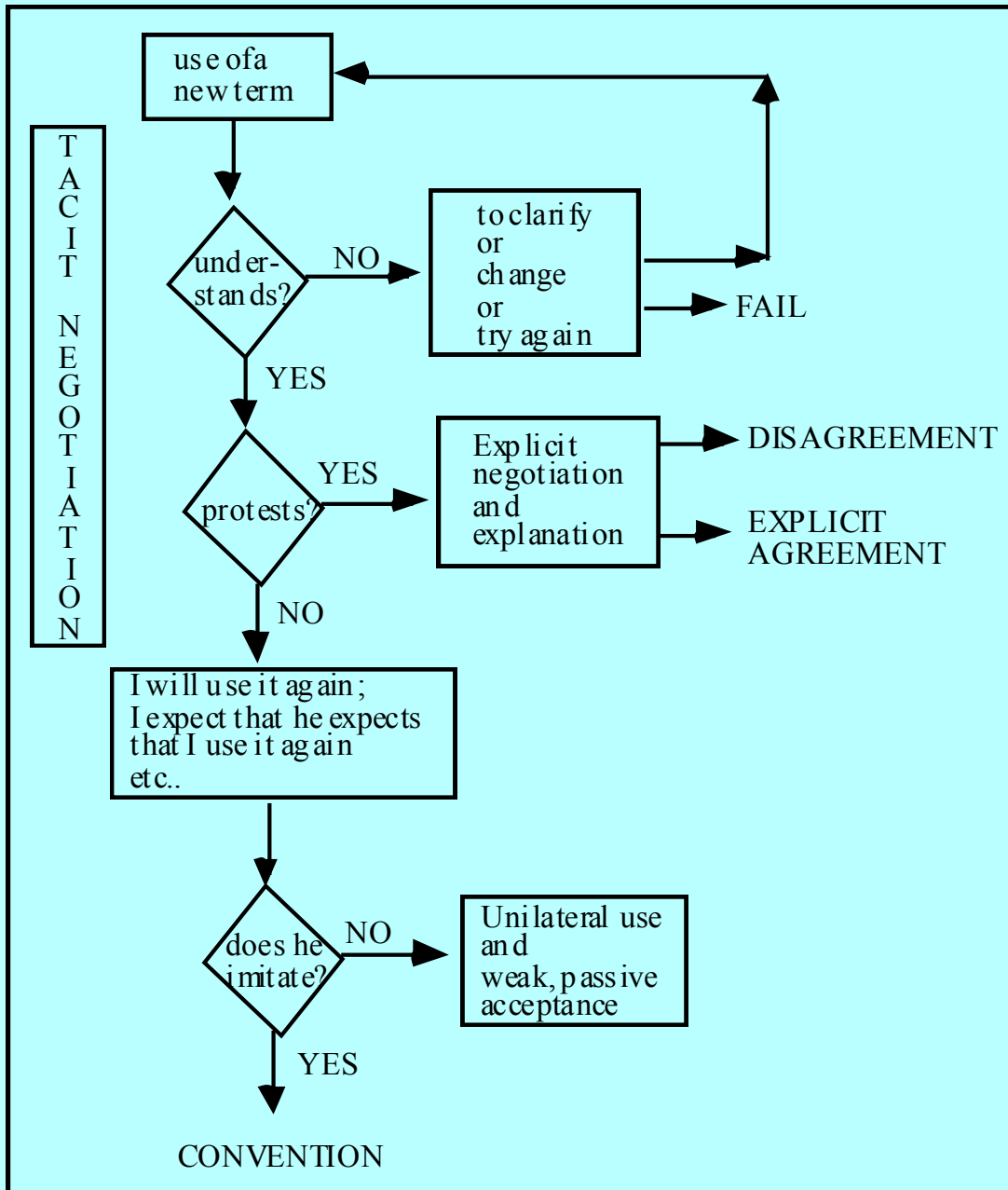
- I believe (and want) that you know that I'm doing (intend to do)  $\beta$  (that you see and understand what I'm doing), i.e. my behaviour is *implicit communication that I'm doing*  $\beta$
- I believe that you could oppose to this (either practically, by stopping me or creating obstacles, or expressing your opposition, disagreement, etc. or even strongly -if you have the authority for this- by prohibiting me of doing  $\beta$ );
- I believe that if you were against my doing  $\beta$  you will oppose to this by some action and communication, while if you do not oppose, if you omit to oppose to my action this mean that you agree that I do it, or at least that you weakly permit me, let me to do it.
- I believe that you believe that I believe all this and that I'm seeking for a sign of your attitude (i.e. that I'm “reading” your behavior -action or inaction- as a sign and communication of your attitude of agreement or disagreement)
- You know all this and you decide of say/doing nothing and letting me doing. You know that your inaction is interpreted by me as a assent/consent.
- Since you decide of not preventing such an interpretation, your inaction is an implicit communication of your assent: you take the responsibility for my interpretation.

# “Qui Tacet Consentire Videtur”

Tacit agreement are based on **a lot of common knowledge** or at least of **shared beliefs**

but also on *two basic implicit communication acts*:

- **x’s “proposal”** (or request of consent):  
by starting doing b (and checking that y is checking) x intends to implicitly inform y that he intends to do b and that he is seeking for y’s agreement;
- **y’s “agreement”** (or permission/consent):  
by not-opposing y intends to implicitly inform x that she agrees with his doing b.





**Coordination** is possible **without** any communication both in human and artificial societies.

However, usually coordination exploits communication.

BIC is

i) a very economic (parasitic),

ii) a very spontaneous,

iii) a very practice and rather effective form of communication

just exploiting side effects of acts, traces, and the natural disposition of agents to **observe** and **interpret** the behavior of the interfering others,

The **basic forms** of **coordination** are:

**Unilateral:** X just coordinates her own behavior with Y's or environmental dynamics, ignoring Y's coordination or non-coordination activity.

**Bilateral:** X coordinates his behavior with Y's observed behavior; and Y does the same. *Bilateral but independent:* X coordinates his behavior with Y's observed behavior; and Y does the same in an independent way.

**Reciprocal:** X coordinates his behavior with Y's behavior by taking into account the fact that Y is coordinating her behavior with X's behavior.

**Mutual:** it is based on symmetric and interdependent intentions and mutual awareness (shared beliefs). Both X and Y wants the other to coordinates with his/her own behavior and understand that s/he intends to coordinate with the her/his own behavior.

# Obeying Norms as BIC

At the collective level, when I respect a norm

*I want the others to respect the norm, pay their own costs and contribution to the commons.*

While doing so I'm **reissuing** the norm, **prescribing** a behavior to the others and **checking** their behavior (expectation).

Thus the *meaning* of my act is twofold:

*“I obey, you have not to sanction me”;*

*“Do as I do, norms must be respected”.*

# BIC basement of Social Order & Interaction

BIC has a privileged role in social order,

- in establishing commitments,
- in negotiating rules,
- in monitoring correct behaviors,
- in enforcing laws,
- in spontaneous emergence of behavioral

conventions

# The Stigmergic Over-generalization

The notion of Stigmergy comes from biological studies on social insects, and more precisely the term has been introduced to characterize how termites (unintentionally) coordinate themselves in the reconstruction of their nest, without sending direct messages to each other.

Stigmergy essentially is *the production of a certain behaviour in agents as a consequence of the effects produced in the local environment by previous behaviour*.

This characterization of Stigmergy is **not able to discriminate** between simple *signification* and *true communication*, and between prosocial and antisocial behavior.

- prey-predator coordination and
- a pilfer (unintentionally) leaving footprints very precious for the police.

**In order to have “communication”, it is not enough** that an agent coordinates its behavior with the behavior or thanks to the traces of the behavior of another agent.

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Stigmergy is defined as “indirect communication through the environment”.  
(Holland and Beckers)

**A wrong definition!!**

# STIGMERGY 2

The real difference is that in Stigmergic communication we do not have *specialized* communicative actions, *specialized* messages (that unambiguously would be “direct” messages because would be just messages);

**we just have *practical behaviors* (like nest building actions) and objects, that are *also endowed with communicative functions*.**

In this sense communication is not “direct” (special communicative acts or objects) and is “via the environment” (i.e. via actions aimed at a physical and practical transformation of the environment).

***stigmergy* is communication via long term *traces*, physical *practical* outcomes, *useful* environment modifications, not mere signals.**

To be true, perceiving behavior is *always* perceiving traces and environmental modifications due to it; the distinction is just a matter of perception time and of duration of the trace.

**Stigmergy is just a sub-case of BIC,**

since in fact any BIC is based on the perception of an action that necessarily means the perception of some “trace” of that action in the environment (for example air vibrations).



# Count-As Actions as necessarily BIC

***Any (intentional) Count-As act is necessarily a BIC, an implicit 'message'.***

- if action A has to *count as* action B in community S,
- if the member of the community that assists to action A (or has news of action A) has to *treat it as* act B,
- if she has to *recognize* and consider it as action B,

this means that the execution of action A is aimed at being (directly or indirectly) 'public' (addressed to some compliant audience) *in order to* be recognized as such (B) and give rise to the appropriate consequent behaviors. In other words,

- Count-As actions are BIC messages to somebody (the appropriate addressee) and this is *an intrinsic function* of them.



# Count-As Actions as necessarily BIC

Constitutive effect is a sort of self-realizing expectation: since and until people expect that A counts as B, it counts as B.

They must (conditionally) believe or at least «accept» (Meijers, 2002) that this is true and that the others believe/accept as they do and will act accordingly.

**Any Count-as effect (convention) and any true institutional empowerment is due to a collective acceptance of the fact, and to a diffuse or to collective intention of acting accordingly** (Tuomela, 1999, 2002).

**The effectiveness of the count-as effect passes through the minds and the consequential behavior of people.**

Thanks to the others' compliance X is really empowered

The others obviously do not recognize this role; they are simply believed to acknowledge what already exists, but in fact they are creating it thanks to this acknowledgment.

# Count-As Actions as necessarily BIC

If A Count-As B in/for the community S,  
then A **means** B for S members

Necessarily, **A is a 'sign' that B**

(or better **accomplishing B is a sign that one is accomplishing B**).

A Count-As act is necessarily '*signaling*' (Schelling).

However,

not only A 'signifies' B (is autonomously read/interpreted as B by some observer) but

- A **communicates** that B, because it is **aimed at signifying** so.

This is true at least in '**active**', '**intentional**' **Count-As action performances**

The communication is (implicitly or explicitly) 'intentional: the subject expects (knows and wants) that the other will interpret the A as B.

Like in 'paying' or in 'arresting' or in **marrying**, etc.

# What Behavioral Implicit Communication is ...and what is not!

**NOT** *Non Verbal Communication* or *Expressive Behavior*, i.e. gestures, conventionalized signals, facial expressions, and so forth. All this sort of specialized messages (either cultural or inborn) are different from simple practical actions like walking or sitting or drinking.....

Although NVC is through some behavior or behavioral features, and BIC is for sure non-verbal and extra-linguistic. The few of BIC that has been identified has been actually **mixed up with** the never well defined and notion of «Non Verbal Behavior»

BIC is an observation-based, non-special-message-based, unconventional communication, **exploiting simple side effects of acts** and the natural disposition of agents to observe and interpret the behavior of the interfering others.

# BEHAVIORAL MONOLOGS

**BIC messages to myself**

# BEHAVIORAL MONOLOGS:

## BIC messages to myself - 1

### Building and Monitoring the *Self-Concept*

Building, confirming, testing our identity by the Signs of our own behavior

BIC in the construction of the self (Brandom): "How am I?"

- To 'show', to proof, to demonstrate to myself that "I am..."

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Neurotic "acting out"

# BEHAVIORAL MONOLOGS:

## BIC messages to myself - 2

### Building and Monitoring the *Self-Concept*

- **Intentional** self-BIC: I want to prove to myself with my act, to 'demonstrate' that I am in such and such a way. I want to see whether I'm like this (as for morality, character, ideals, abilities, etc.).
- **Functional** self-BIC: I'm in fact automatically monitoring my behavior, and checking for its coherence with my expectations about me and my behavior, and my self-concept. I do not intend to show me that..., or to see whether...; but in fact one function of my behavior is to inform me about me.
- **'Self-presentation'** (first of all) is to our selves.

# BEHAVIORAL MONOLOGS:

## BIC messages to myself - 3

### Self-teaching

“...when I control whether I play... correctly” (Stekeler), when I evaluates my performance, I’m the teacher of myself.

**While playing I’m ‘showing’ ‘demonstrating’ to my self;**  
with my act, I’m asking to myself *“Is this OK?”*.

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The use of BIC for myself, presupposes that

**we read our behavior, as ‘signs’ of our intentions, capacities, internal unobservable properties.**

And in fact we can even be ‘surprised’ by our selves: my own behavior can be a **revelation** of myself to myself.

# CLOSE THEORIES:

- **SIGNALING**
- **Goffman**



# DRAMATURGICAL Th

(Goffman)

- does not distinguish yet between mere *signs*, information sources, and real *messages* sent to the others.
- does not develop a systematic theory of this phenomenon
- it seems that these 'sign-vehicles' have only the function "to tell us the performers social statuses", to mark rank and subordination; and that their real goal (when deliberated and controlled) is only impression management, representing a character.
- very interesting distinctions - like between "giving" (controlling direct and conscious signals) and "giving off" (signaling in an indirect and unconscious way)

# SIGNALING Th

(Schelling, Economics, Ethology, Anthropology, Sociology (Veblen)..)

- ambiguous about “*signification*” (mere signs) and “*communication*”
- mixing up *conventional* and *unconventional* signs
- focused on the issue of the reliability of the sign, the costs of producing/exhibiting deceptive signs

# "Signaling" loyalty and enforcing norms

(Eric Posner)

- A sub-class of institutional messages
- Ignoring the general BIC at interpersonal (ex. Imitation; mutual recognition) and group level (ex. Practical coordination)
- Limits of 'signaling' Th

# BIC in Speech Acts

ex. **BIC “to create a rapport” with the other** (Ch. Taylor-Gilbert)

The content is irrelevant at all (either already well known and shared; or without any interest).

***What really matters is the fact that I want to put in common it with you, or – more in general - that I want to create a rapport with you.***

**This is what I'm really communicating by the simple act of an irrelevant sentence:**

*“I want to contact you” “I have the intention to establishing/maintaining a interaction/conversation/ a relation with you”.*

**This is a behavioral message: about my disposition or intention, and about (how I see) our relation.**

# **BIC and LANGUAGE**

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- **BIC and the origin of *meta-communication* in Language**
  - **BIC and linguistic '*implicatures*'**
  - **BIC and *Meaning & Linguistic Rules Negotiation***
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## **BIC for *Meaning & Linguistic Rules Negotiation***

- 5(a) *Imitation in learning and teaching is BIC based and this also applies to language learning and spreading***
- 5(b) *Communicative 'conventions' and linguistic conventions and rules are 'negotiated', changed, and transmitted by BIC.***

**A toy example**

# B/C and LANGUAGE

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## An example: linguistic negotiation (terms, meaning, syntax, ...)

To name X I use the new term *bbb* (for example to call Amedeo I introduce the name «Amed») with my hearer H:

1. my hearer understands (I infer this from her answer or reaction)
2. my hearer does not protest/discuss

I interpret H's non-protesting/discussing as an implicit acceptance (at least passively and for the moment) of my use; and -more than this- of an implicit behavioral communication of such an acceptance (in not reacting H is *communicating* me «OK, I let you use this term»)

This is some sort of **weak «implicit acceptance»** of my use of *bbb* by H. When I will use again *bbb* with H I will **expect** (believe + want) that

- H understands again,
- H will not protest/discuss
- H knows about my expectations.

In **strong implicit acceptance**, H **re-uses** herself the term *bbb* (in the same occasion or later). In doing so H expects that:

- I understand,
- I do not protest/discuss
- I know about these expectations.

There is now a true implicit **convention**, a tacit agreement about using *bbb* (at least between us and in similar contexts) We can distinguish **two phases**.

- One is a **tacit negotiation** and produces *weak implicit acceptance*;
- The other is **active reuse** and produces a true *convention*.

If somebody else listen to us in using *bbb*, or H uses *bbb* with other people, the new term is **spreading** around and a diffuse collective linguistic convention is establishing.

# **BIC and LANGUAGE**

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**A toy example**

# Fulfilling **Social Commitments** as BIC

another kind of **demonstrative act**, intended to show that one have done the *expected* action.

A **Social-Commitment** of X to Y of doing the act, in order to be really (socially) fulfilled, requires not only that agent X performs the promised action , but also that the agent Y knows this.

**Thus the performance of the act is also aimed at informing that it has been performed!**

(If there are no explicit and specific messages) ***any act of S-Commitment fulfilment is also an implicit communication act about that fulfilment.***