

Towards a Sociological View of Trust in Computer Science

Dietrich Fahrenholtz¹ and Andreas Bartelt²

¹Project Unit e-Solutions, T-Systems GmbH, Hamburg

²Distributed Systems Group, Computer Science Department, University of Hamburg, Germany

¹Dietrich.Fahrenholtz@t-systems.de,

²bartelt@informatik.uni-hamburg.de

Abstract

There is a consensus among researchers across many disciplines that trust is one of the most pressing issues domains with online-participants involvement face. A lack of trust, e.g., manifests itself in many e-Commerce domain phenomena, such as canceled on-line shop purchases, decreasing number of e-auction participants due to auction fraud, and virtual community establishment. Because trust is both a commonplace and a somewhat abstract, elusive phenomenon, not only computer scientists were tempted to use the term ambiguously and in a way they thought to be appropriate, but without a solid backing from traditional sciences such as sociology and psychology. Our aim in this article is to provide an overview and conceptual clarification of the term 'trust' and its multiple facets from a sociological point of view. We show on the basis of abstract trust forms how these are related to specific types of social order and how societal practices contribute to the achievement of stable, cohesive, or collaborative orders respectively.

Keywords: trust, reputation, habit, memory, collaboration, cooperation, solidarity, tie, society, toleration, legitimacy, trust management

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1 Introduction

There is a consensus among researchers across many disciplines such as psychology, sociology, economics, and computer science that trust is one of the most pressing issues e-Commerce faces. A lack of trust manifests itself in many e-Commerce domain phenomena, such as canceled on-line shop purchases, decreasing number of e-auction participants due to auction fraud, and virtual community establishment, to name a prominent few. In addition to the e-Commerce domain, authors of [Bartelt et al., 2001] note that e-Information also benefits greatly from a proper understanding and use of trust. When considering the parties of an electronic market, it is vital that they establish a trusted, balanced, and workable business relationship characterized by openness, well-informedness, fairness, confidentiality, and integrity.

It is of special interest to look at the main ingredient of this ‘glue’, i.e. trust, that keeps those markets running and its participants bargaining with one another. This brings many nagging questions for computer scientists if they want to be successful in tackling the trust issue such as: “Does our model capture all necessary parts of trust?“, “How do we ensure that user trust is in sync with our model?“, “How do we monitor system and user performance in terms of trust?“, and above all “Do all of us share a valid and common understanding of the phenomenon trust?”

Until recently, the notion and the use of the term “trust” were rather ad-hoc and intuitive. Because trust is a both a commonplace and a somewhat abstract, elusive phenomenon, not only computer scientists were tempted to use the term ambiguously and in a way they thought to be appropriate, but without a solid backing from traditional sciences such as sociology and psychology. So our aim in this article is to provide an overview and conceptual clarification of the term “trust” and its multiple facets from a sociological point of view. We hope to outline a basis on which future research in computer science will draw. We believe, however, that computer scientists, and technology devised by them, will have its difficulties for quite a long time capturing and modeling the phenomenon of trust in its entirety.

2 Character and function of trust

Since interest in trust originated in sociology and has recently gained momentum in economics and computer science, taking a closer look at the original sociological research and its findings is vital in order not to be misled by one’s own “intuition” or “common sense”.

It is agreed that trust is a precious, sometimes scarce resource of collective interest and as a premise facilitates social cooperation and solidarity. Seen from a psychological perspective, trust is demonstrated or denied for various reasons. The reasons why a person trusts or mistrusts may not be clear or even conscious to him/her in every case. Nevertheless, trust is a social tie that is subject to its own laws. When considering a world of many possible experiences and actions, the complexity of this world is inevitably higher compared to a world that does not offer such a multitude of experiences and actions. So a human being is faced with the task of coping with this complexity. People find themselves incessantly confronted

with venturing a step into the future. How are they to decide? S/he needs to limit the possible future outcomes of her/his decisions/actions because s/he can neither try all possibilities nor has desire to do so. This can be accomplished by following the path of action which is most trusted, i.e. anticipation of the future due to experiences from the past. Proceeding in this manner, people are able to manage their daily life otherwise they would not dare to leave their home because of fear something hazardous would happen to them [Luhmann, 1979].

So, if trust is necessary to cope with the contingency and arbitrariness of social reality and helps us process the complexity and volume of everyday information, it makes sense to study the structure and components of trust in greater depth.

In the course of the following discussion, we present recent findings [Miztal, 1996] of sociologist B. A. Miztal who investigated trust in modern societies. According to her, every society employs ordering principles and rules that govern the living together of its participants. These orders can promote stable, cohesive, or collaborative societies. Every social order, in turn, relates to a trust form. That means, trust in each social order performs a constituent function and reinforces the type of order. Since trust forms are an abstract, categorizing concept, three concrete practices belong to each form. Practices in this respect mean a ‘modus operandi’, a process, or a behavior that a person follows in order to replace missing information with an internally guaranteed security (see Figure 1).

In the next sections we will see how forms and their practices relate with each other.

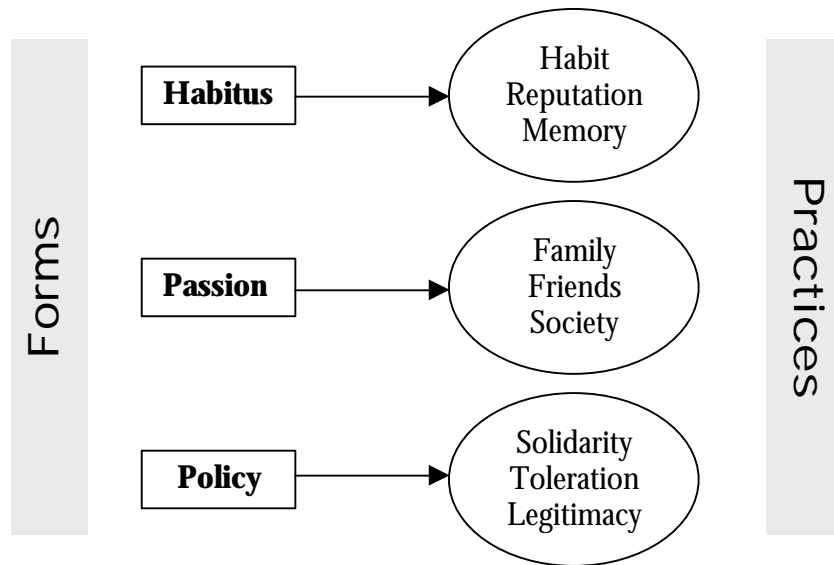


Figure 1: Relationship of Trust Forms and Practices

2.1 Types of order: stable

The trust form “Habitus” consists of practices that exercise a stabilizing function on a social order. Its first practice, habit, operates with routine behavior, rituals, tradition, and background

assumptions. There are habits that are characteristic of a person and can be seen as a personal trait. Once established, habits lead people to a more or less continuous everyday performance that is necessary, for instance, to interact successfully with other group members. Most of our striking habits are acquired such as smoking, others are innate such as breathing, to give two trivial examples. Acquired interpersonal habits need routine in order to be effective. They can be divided into three sub-types:

- social habits of contact or routine practices
- mental habits or taken-for-granted assumptions
- ceremonial habits or rituals

The first type refers to repetitive, familiar behavior towards others. A physician, for example, who examines patients in a way that follows professional standards would show a behavior that falls into this category. Routine practices have the important capacity for 'ordering' or for 'patterning' our daily life. An interesting feature of the second type is a breach of tacit assumptions, having a normative and thus stabilizing character in a group, would inevitably lead to social sanctions. Hence mental habits consists of reasoning processes that usually run in the subconscious and that presuppose an outcome without any doubt. The third type is primarily oriented toward groups. Ceremonial habits and rituals follow rules of etiquette and are used when groups or members of a group enter a different chapter of life or change their status. All three types transfer and map past experiences on the present and thus increase predictability of social order. In this respect, trust and habit can be seen as performing the same function, that is, reduction of social complexity. But there is a distinction between these two. Trust allows us to make a decision without the possession of complete knowledge and thus facilitates taking risks. Habit, in contrast, provides well-known, familiar practices that simplify social complexity. Both, however, are interdependent. Subconscious trust, for example, is an ingredient of routine behavior, i.e. habit.

The second type, reputation, is a mechanism which provides a behavior guideline in how far trustors can trust trustees so that former maintain their investment. People, things, and events are identified and subsequently selected by trustors according to preconceived concepts, established reputations, or stereotypes. Reputations are formed and sustained by the anticipation of rewards or sanctions usually issued by a group a trustee is member of. It is a necessary prerequisite that members are able to communicate their approval or disapproval to other members. In this way, groups can categorize and disseminate internally whom to trust and whom not to trust. This is accomplished by mutual recognition of one's standing in terms of trustworthiness. Without knowing a person's reputation, it is impossible to receive any information about the trustworthiness of this person prior to getting into contact with other members of the group. Reputable persons invest resources of all kinds and meet promises, since a good reputation brings about a competitive advantage and helps cut down transaction costs. That is why reputation is often referred to as social capital. In modern life where face-to-face contacts are not possible in every case, people tend to rely more on formal evidence of

reputation such as certificates, testimonials, credit lines, or membership of a professional body. Reputation, needs to be secured and confirmed in these sometimes uncertain and complex environments by formal control which monitors and sanctions participants if necessary. Considering smaller circles such as family and friends, reputation within these groups is easily established and sustained and does not differ from trust.

According to [Misztal, 1996] there are three, not necessarily mutually exclusive mechanisms which provide the basis for building a reputation:

- a) ethics (values, morality)
- b) conformity to social pressure (reciprocity of exchange)
- c) formal control (rewards, sanctions, monitoring, and discipline)

Individual motivations to build a reputation are:

- a) self-interest (anticipation of utility of good standing)
- b) values (moral obligation)

Eventually, a person is reputable for one or more specific categories

- a) virtue (honor)
- b) making credible promises (credibility)
- c) his/her denial of reputation (stereotypes)

However interesting a discussion of these categories is, we would like to refer the reader to [ibid.: pp.128] for an examination of the last a) and b). c), though turns out to be an unusual point. Stereotypes, on one hand, help people come to grips with social reality. On the other hand, those who use them find reality more comprehensible. Their popularity in society makes it possible for indifference to flourish because they deny identity and selfhood and thus lower the likelihood of mutual trust. Gender roles, for instance, are an evolving stereotype. Consider a woman's role in politics today and 100 years ago. Others, relatively stable stereotypes are those connected with race and national identity. We are likely to show less trust to people not of our own race, for instance.

The third type, memory, refers to the preservation of identity, legibility, and continuity of collective experiences. Memories are shaped by interpreting the present according to specific preconceptions, that is, they are constructed, sustained, transmitted by families and other communities to which we belong. A continuous re-interpretation of the past by the remembering subject equipped with a framework for recalling the past secures the legibility of the present. Groups conceive of an image of the world by establishing an agreed version of the past. Communication between their members brings about this version of the past not private remembrance, since memory is not solely a property of a single individual. It comes from the outside because it is coded in language. Trust, on one hand, as 'weak inductive knowledge'

[*ibid.* Simmel] and memory, on the other hand, as ‘uncertain and unstable knowledge’ [*ibid.* Fentress and Wickham] perform a similar function; they let us cope with uncertainty and complexity of social reality and provide for coherence in our social world. Another similarity between trust and memory is that both can easily be “destroyed” if new experiences and ideas or contrary evidence crop up. In terms of cooperation, the best means of securing it is to have no memory, to forget that past defections may be repeated in subsequent interactions [also see Axelrod, 1984]. Although collective memory is an inseparable part of any culture, life, as Axelrod shows, will be nearly impossible without any oblivion. Trust, therefore, can be a guideline of what we should remember and what we should forget from our past since trust is not only a belief based on past experience, that is, a product of memory but it is also a source of it. One of the core issues of trust and memory is the question, how to design rules of remembering and forgetting in such a way that trust within society and towards others will be possible and can be sustained.

2.2 Types of social order: cohesive

Trust as the second form, “passion”, operates through internalization, moral commitment, bonds of friendship, and common faith and values. This type of trust is an important part of one’s identity and is not strategic or rational. It is based on our reliance on others’ good will, i.e. others ‘collectivity-orientation’ [Parsons, 1971]. Family, friends, and society span a trust continuum with family as a source of highest trust and society in general as one of the lowest.

Starting with family, [Giddens cited in Misztal, 1996] defined the term as a ‘group of individuals related to one another by blood ties, marriage, or adoption who form an economic unit. The adult members of which are responsible for the upbringing of children’. The family is the primordial source and location of trust. The question ‘if you cannot trust your family, then whom can you trust?’ [Barber cited in Misztal, 1996] shows the existential meaning of trust in this context. Early trust, also referred to as basic trust, is a by-product of family activities and attitudes. Infants in families learn to rely on the consistent attention of their providers. In this way their ability to trust and their development of self-identity is being cultivated. They learn to grow up to competent, often optimistic adults. This process of learning requires trust in the reliability of the sources of knowledge, i.e., parents. However not every infant is fortunate enough to grow up in a family where it can learn to trust. Infants who spent their early years in a disturbed family are likely not to feel emotionally secure and they are prone to develop a pessimistic attitude towards life. On the other hand, before partners form a family, they need to develop trust through mutual disclosure which, in turn, is closely connected to the achievement of intimacy. This disclosure, however, should not turn to a ‘tyranny of intimacy’ where privacy and personal secrets are as good as prohibited. There should be opportunities of autonomy that are an essential condition of building trust relations based on self-actualization.

Friendship, in a sense, is also a ‘reliable alliance’ but usually less emotionally loaded. It is a bond that can be trusted to be there for you when you need it. According to statistics, we tend to choose as a friend someone who resembles us, who is of same age, occupation, sex, and

race. In a friendship, sentiments of closeness and intimacy are reciprocated for their own sake. If this reciprocity becomes one-sided a friendship is in acute danger. A close friendship, moreover, is made up of a strong tie, that is, close friends spend a lot of time with each other. The number of close friends is therefore limited. However, sometimes it is advantageous to have one or more weak ties in order to act as a bridge between a networks of friends [Granovetter, 1973].

With the growing complexity and fragmentation of social life, friendships aiming at absolute intimacy become more and more difficult because differentiation among people increases correspondingly [Simmel cited in Misztal, 1996]. Thus complete understanding of one's closest friend is likely to dwindle. Friendship is an essential step towards developing empathy, understanding of others, and interpersonal trust. The latter being vital for the existence of societal trust allows us to trust the structure of situations in more complex settings. If societal trust is actually absent, suspicion, distrust, isolation, and lower levels of cooperation are likely to prevail. The greater the amount of trust within a society the greater the likelihood of cooperation, which in turn contributes to the establishment of trust relationships. However, individuals cannot trust and feel obliged to all members of society, they need to define boundaries, e.g., whom to trust and whom to be obliged. Thus there is not only a need to decide on entrance rules, i.e., setting up criteria of group membership, but to decide what to expect from members of a societal group.

2.3 Types of social order: collaborative

The function of the third form, "policy", is to foster cooperation/collaboration which consists of four basic elements: coercion, interests, values, and personal bonds [Williams, 1988]. The first of three practices is concerned with solidarity, that is, a culturally embodied view of the relationship between self and society. The second practice, toleration, describes the degree of inclusion of individuals and groups in a system. Finally, the third practice, legitimacy, explains the degree to which a system is viewed as fair and just.

Starting with the first practice, solidarity, it is concerned with the commitment of individuals to subordinate their personal interests to a larger social whole. Solidarity, as opposed to the trust form passion, is not empathy and sameness but is based on mutual understanding, common interests, and destiny. In order to see how trust and solidarity relate to each other, we need to define the concept of community with its multiple meanings. Often community refers to a locality, i.e. a place of daily living where members can see, meet, and come into social contact with one another. Members are committed to one or more uniting goals and thus transcend individual interests. The number of members in a community is usually limited because of entrance rules and lack of accord with community goals. Characteristic of communities are members sharing bonds of solidarity and, in a sense, common identity. The other side of the coin of excessive communitarism is that too tightly coupled groups are seen as potentially hostile to a larger society. Such communities can be undemocratic because of their risks of monism, conformism, and coercive consensualism

[Barber cited in Misztal, 1996]. For trust and cooperation to thrive in communities, informedness and voluntary participation, not blind conformism, are basic. A solidaristic order relies on a rational consensus attained on the basis of convincing others and taking responsibility for the outcome. This should be done with reciprocity in mind and without calculation of individual advantages and without coercion. Thus, solidarity is able to reduce the probability of “free riders”, that is, individuals who quickly hop from one community to the next when their personal interests are or cannot be satisfied in a certain period of time. So if bonds of solidarity are to be fostered and strengthened

- a) economic interests and needs must be satisfied,
- b) the relationship between self and society must be embodied in culture, and
- c) an existing democratic political structure must be trusted.

Thus by constructing conditions of equality, participation, and commitment, people have a genuine sense of an equal stake in society, which in turn builds trust. People can play one or more roles in society and they can be made more cooperative by incorporating levels of interdependence into their roles. In addition to that, reciprocity and fairness characterize normal role behavior. In such a system, trust in others is built on the expectation that others are constrained by duties and requirements of their roles. Solidarity and trust make it possible to adopt the long-term solution. They allow for planning the distant future and defer short term profits.

There are also, however, communities where distrust and (sectarian) solidarity, seemingly so opposed, are united. A universal human fear of the unknown is reinforced by refusing to deal with and to engage in the outside world. Not only distrust of non-members but also distrust of other members impose conformism and controls loyalty. He who defects or changes ‘betrays’ the community. Therefore, people have to be watched and tested.

The second practice, toleration, is concerned with the question of how do people with pronounced differences live, work, and deal with one another. As Zeldin notes, toleration [Zeldin cited in Misztal, 1996] is not a passion (see second trust form) but rather

- a) the reluctant acceptance of a burden,
- b) the coming to terms with what one cannot avoid, or
- c) what is not exciting enough.

Modern life forces us to ask if it is sufficient to ‘live and let live’, that is, if tolerance understood as short-term remedy rooted in indifference is an adequate course of action. Toleration seen as the absence of impediments and discrimination is the most important and most necessary element of any democratic regime. It is based on the recognition of the independent validity of other people’s claims and on the principle of justice as fairness. But in order to create conditions for social cooperation, equal respect for all opinions, perspectives, and all people is needed. Furthermore, tolerance as a necessary component to build social

cooperation and trust needs to promote people's self-confidence and critical reflection. People should be empowered to confidently manage and direct their lives. They should consider their actions carefully and should be able to exercise their freedom actively. This strong trust in self-government is necessary to sustain liberty because without it, anxious individuals 'will be all too willing to choose a secure slavery, i.e., handing power to a paternalistic state that promises to handle their interests better than they can' [Macedo cited in Misztal, 1996]. So to be the author of one's own life, one needs to take risks, to be reflective, and to have autonomy. A prerequisite to these is to have a plurality of alternatives from which to choose.

Intolerance, on the other hand, results in distrust within society and between the state and its citizens. The result, a denial of pluralism, is the main feature of totalitarian systems in which there is only a single truth.

The third practice, legitimacy, as defined by Lipset, is the capacity of systems to engender and maintain the belief that existing political institutions are the most appropriate for the society [Lipset cited in Misztal, 1996]. For [Weber cited in Misztal, 1996] legitimacy involves a certain degree to which institutions are valued as a quality of themselves and considered proper and right. Since these institutions have both practical and normative justification, they are necessary for the maintenance of order in society, in relationships between individuals, and they are the means of our own moral development. Legitimacy, among other requisites, explains the persistence of social and political arrangements. These arrangements do not rest on a shared value system, but rather on the organization of political processes and performance of the state. A power relationship is not legitimate because people believe in its legitimacy; it is legitimate because it can be justified in terms of their beliefs. This distinction provides an assessment of legitimacy, that is, to what extent a system satisfies people's expectations. It should be noted that performance of democratic institutions must be monitored over a period of time in order to come to a valid conclusion on their legitimacy.

Legitimacy does not rely on trust, but rather on an impersonal sense of duty on the part of the followers to follow commands of a proper authority, whoever that authority is and whatever the content of the commands. This obedience to the authorities is achieved by incentives such as rewards and sanctions. A higher level of compliance and social cooperation, however, is only attained by trust. Thus trust can be an indicator of legitimacy, can be derived from it, and contribute to its reinforcement. Legitimacy as a policy of trust requires not only participatory and deliberate democracy, but also the conception of a state as a guide ensuring effective cooperation towards shared goals.

2.4 Form-independent properties of trust

Trust, which is referred to as a subjective degree of belief about other people [March, 1994] is dynamic and non-monotonic, i.e. personal experiences may increase or decrease one's degree of trust. It is highly context-dependent, i.e. different observers in a context perceive and interpret events differently. Trust beliefs are also influenced, as we have shown, by reasoning, social stereotypes, communication, and spreading of reputation [Bacharach et al., 2001]. To

trust means, one is vulnerable to the outcome of a decision and risks and uncertainty are necessarily involved with it.

2.5 Degrees of trust

As we all know, trust is not a binary mental state, an “on” or “off” phenomenon. Considering trust of the trust form “habitus”, it is scaleable and depends on, among other things, the value, importance and utility of some goal a person pursues. That means, in order to come to a trusting decision, a person must be able to evaluate involved risks. The greater the risks, the greater the needed trust. If, for instance, the evaluation of a risk is below a maximum risk threshold and utility is the person’s greatest concern s/he decides to trust, otherwise not to. After having evaluated the risks internally a person comes to a conclusion, and s/he is to some degree certain that the desired future will happen. This evaluation process takes into consideration pertinent beliefs formed in the past. So if, for instance, a trusting decision finally leads to a positive experience it will increase trust in that context by a specific amount. In the opposite case of a negative experience being made, trust in that context is diminished considerably if not completely destroyed.

3 Peculiarities of trust

Although it is tempting, we should not confuse trust with reputation, except in the family context, since reputation is the more ambiguous concept. Reputation is a public opinion which can be manipulated by stereotyping or collusion. In contrast, trust anticipates a proper and adequate behavior in all circumstances and involves broader, less specific expectations. In order to make a trusting decision, knowledge derived from previous experiences in a context is necessary. If such knowledge is lacking, then one is not familiar enough with the context. Since trust and distrust presuppose familiarity, a decision not influenced by familiarity cannot be said to be a trusting decision because it is based on the pure hope that everything will work out eventually [Luhmann, 1979].

Furthermore, we don’t think that trust can be “managed” because it is an inherently humane concept. For authors of [Blaze et al., 1996; Chu et al., 1997], trust management is a security concept which ensures proper authorization. Authors of [Ketchpel et al., 1996] use Trusted-Third-Parties to establish all-or-nothing trust between (computer) parties of an electronic commerce transaction. In all three scenarios, trust is used as an inter-machine property. However, we believe trust relationships occur between living beings and improve gradually as parties interact with each other in the course of time. The idea to use reputations to build trust between users in a virtual community is mentioned by authors of [Abdul-Rahman et al., 2000]. Their idea is much closer to our vision. Their system, however, is lacking necessary security features to stop tampering with reputations.

Speaking of the linguistic opposite of trust, is distrust or mistrust really antagonistic to trust as the author of [March, 1994] suggests, that is, the more I trust the less distrust I feel? We

show an example, taken from [Beer, 1992], where trust and distrust coexist independently from each other in one person:

Consider a relative happily step-family, a man Randy and a woman Linda, with her children from a previous marriage. Randy has a son Alex who is in the custody of his mother. Alex is emotionally disturbed and neglected by his mother, so Randy initiates a court procedure to protect Alex. Randy, however, does not accept custody for Alex because of the potential disturbances that may be caused to his new family. Ignoring the difficult and perhaps questionable decision of Randy, Alex feels trust in his father established a long time ago and at the same time massive distrust because of his father's decision.

4 Quo vadis trust?

Considering trust in the computer science domain, we think that it is a significant challenge to capture in computer systems the elusive notion of trust. We do not know of any research paper that addresses the issue of what features of trust are really necessary in a specific domain, such as Electronic Markets, and which features may be of secondary importance. Since trust, as we have seen, is a function of many, not easily measurable, internal, humane and societal parameters and manifests itself in forms such as habitus, passion, and policy, we believe that only an integrated, holistic approach will address the trust issue appropriately. Hence a technical system must convey trustworthiness on any layer be it presentation, application, technology, or knowledge. That means the system we envision is made up of security, reputational, and peer-to-peer components in order to maximize the trustworthiness that is attainable by computer technology. We believe that trust in such a system is greatly enhanced if the system is introduced and explained by someone who is trustworthy and trusted for being competent and well-disposed towards the trustor. Since trustworthiness alone is not enough, we are to conduct user trust evaluation trials to see if our envisioned system meets the requirements.

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