The Kula Ring of Bronislaw Malinowski: Co-evolution of an Economic and Ceremonial Exchange System

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Abstract

The Kula Ring described by Bronislaw Malinowski is a system of the ceremonial exchange of gifts among a number of tribal societies inhabiting various island groups in the region east of Papua New Guinea. Two ceremonial gifts continually circulate in opposite directions: necklaces clockwise and armshells counterclock-wise. After a brief description of the social system of Kula exchange, a game-theoretic interpretation of the ceremonial exchange as a signaling system for peaceful relationships, with inbuilt checks against cheating, is given. A simulation model of the starting mechanism is presented to account for the emergence and stability of the observed pattern of circular exchange of the two ceremonial gifts. Three processes are distinguished: the development of an economic trading network, the spread of peaceful relationships and the evolution of a ceremonial exchange network of Kula valuables. These processes are systematically linked to model the spontaneous emergence and co-evolution of the Kula Ring.

Keywords: Kula Ring, Social order, Ceremonial exchange, Signaling, Simulation

1. Introduction

The Kula Ring described by Bronislaw Malinowski in 1922 is a system of the ceremonial exchange of gifts, which has been cited and analyzed over and over again. The bibliography of Martha Macintyre (1983a) contains 625 publications that have dealt with the phenomenon of the Kula. Scholars have been fascinated by the specific pattern of the exchange network, which links numerous partners directly and indirectly in a ring-like structure, and where two ceremonial gifts (*vaygu'a*) continually circulate in opposite directions. The total structure has neither been intentionally created by the individual actors nor designed by a central authority. It is the unintended by-product of so many doings and at the same time provides favorable conditions for its reproduction.

The theoretical interpretations of the Kula so far presented have mainly concentrated on the functions of this institution which could also help to explain its maintenance. However, an unsolved problem remains: What kind of *starting mechanism* could account for the spontaneous emergence of peaceful exchange which builds only upon the strategic situation of dyadically interacting potential partners having an incentive to trade but being uncertain about the intentions of potentially hostile foreigners and (at least in the beginning) not being bound by a universally accepted "norm of reciprocity" which does not only apply to clan members but to strangers too?

2. Outline of the Argument

After a brief description of the social system of Kula exchange, we discuss three processes underlying the development of such a complex macro-structure: the development of an economic trading network, the spread of peaceful relationships and the evolution of a ceremonial exchange system. Before elaborating the assumptions of

our simulation model, we present the methodological approach and describe the explanandum – the "observed" Kula Ring – and the empirical boundary conditions.

In the following sections we then discuss the three processes more in detail. The behavioral assumptions of our simulation model are derived from game-theoretic reasoning. Special emphasis is given to the importance of cheating and trust and the controlling influence of reputation. We then ask how such a macro-structure may have arisen out of the individual actions of multiple groups of actors. A simulation model of the starting mechanism is developed to account for the emergence and stability of the observed pattern of peaceful trade and the circular exchange of the two ceremonial gifts. Differentiating among separate "historical phases" improves the empirical fit of the simulation model. Results are then presented to demonstrate the implications of a "counterfactual" assumption about the number of *vaygu'a*. Thereafter, we briefly discuss changes of the historical Kula Ring observed in the 1970's and describe how these may be explained. In the concluding section, we briefly discuss limitations of our approach, and close with some open problems for further research.

Our *basic aim* therefore is twofold: (1) to explicitly state the behavioral assumptions of a starting mechanism for the emergence and co-evolution of a peaceful system of economic and ceremonial exchange and (2) to use simulation as a methodological device in order to demonstrate the macro-social consequences of a multi-level, multi-agent, dynamic system and compare them with the observed structure.

3. The Social System of Kula Exchange

Before discussing the simulation model let us briefly describe the Kula exchange which links a number of tribal societies inhabiting various island groups in the Massim region east of Papua New Guinea. They are culturally, especially linguistically, heterogeneous, are internally organized in clans and local communities, and predominantly possess a matrilineal kinship system. They are called stateless societies, as the positions of chiefs and "Big men" are not integrated into an overall authority system.

Malinowski describes the system of Kula exchange among these tribal societies as follows: "The Kula trade consists of a series of ... periodic overseas expeditions, which link together the various island groups, and annually bring over big quantities of vaygu'a and of subsidiary trade from one district to another. The trade is used and used up, but the vaygu'a – the armshells and the necklets – go round and round the ring." (1966a, p. 103). The two ceremonial gifts always circulate in opposite directions: necklaces (soulava) clockwise and armshells (mwali) counterclockwise.

The exchange of gifts is strictly ceremonially regulated. Twice a year, oversea expeditions take place under the leadership of "Big men". The dates are scheduled in advance, and depend both on the prevailing direction of the monsoon winds and the periods of harvesting. The visitors themselves do not bring *vaygu'a*, but start the exchange with a small opening gift, which the hosts reciprocate by offering the Kula gift, e.g. necklaces. Only at the later visit, the former – now acting as hosts – present the complementary *vaygu'a,* i.e. armshells. By this pattern of delayed reciprocity, each actor is alternatingly indebted to his partner. If a host does not have the proper *vaygu'a*, he may give an intermediary gift (*basi*), which also has to be accepted and reciprocated. No one may keep a gift too long, thereby running the risk of loosing his reputation and his partners. "A man who is in the Kula never keeps any article for longer than, say, a year or two. Even this exposes him to the reproach of being niggardly and certain districts have the bad reputation of being 'slow' and 'hard' in the Kula." (Malinowski 1966a, p. 94). Through public ceremonies, magical rites and rhetorical skills one tries to influence its partners, inducing them to give generously.

The Kula exchange does not take place on an anonymous market, but within lifelong partnerships that are transferred to the heirs by mortuary rites symbolizing the stability of the relationship (Uberoi 1962, p. 107). One also does not join the Kula, but is introduced to it by members, usually close relatives. This principle of co-optation into a "club" enhances the trustworthiness of the new entrants and the stability of the relationships. The number of partners as well as the distance covered by the exchange varies with social rank. But even the most influential chief does not exchange beyond a certain geographical distance. Yet, he as well as the common members knows the names of his partners' partners, and the idea of being part of a closed system is widespread.

The principle of delayed reciprocity and the possibility of intermediary gifts may strategically be used to establish new partnerships with a limited fund of *vaygu'a*. As one informant reports: "I have become a great man by enlarging my exchanges at the expense of blocking theirs for a year. I cannot afford to block their exchange for too long, or my exchanges will never be trusted by anyone again. I am honest in the final issue." (Fortune 1989, p. 217).

Protected by these peaceful social relationships, which are stabilized by the ceremonial exchange of gifts, there also is heavy trade of commodities (*gimwali*) going on. However, no bartering or haggling occurs between Kula partners themselves, though always within their villages. "The trade takes place between the visitors and local natives, who are not their partners, but who must belong to the community with whom the Kula is made." (Malinowski 1966a, p. 362).

This short description of the Kula exchange obviously does not present all the details of this much more complex and differentiated social institution, but concentrates on the main characteristics of the relationships *between* the Kula communities, which are important for the explanation sketch. We especially neglect the internal functions of the Kula, such as competition and enhancement of social status, the rank-ordering of the valuables, the individual names given to specific *vaygu'a,* or the great symbolic importance of the Kula valuables for ceremonial activities, marriages and mortuary rites.

The most important primary sources about the early Kula are Fortune (1989 [1932]); Malinowski (1920, 1966a [1922], 1966b [1935]) and Seligman (1910); about more recent developments see Leach and Leach (1983). Belshaw (1955), Damon (1990), Uberoi (1962) and Weiner (1976) present detailed analysis of various aspects of this social institution.

4. The General Problem of Explanation: Barter, Social Order and Ceremonial Exchange

What are the *guiding theoretical ideas* explaining the evolution of this ceremonial exchange system? According to the prevailing interpretation in anthropological literature the main function of the Kula is the creation of a social order by establishing a network of stable, peaceful social relationships among stateless tribal societies, thereby fostering economic trade among them. Without pretending to be able to explain every detail of the institution and account for all its functions, we argue that *the basic reason why the Kula system came into being and developed its peculiar geographical shape has been the mutual advantage of economic exchange, and that the ceremonial exchange of gifts is an important mechanism for establishing a peaceful social order*. Prestige competition seems to not have been an important factor for the *emergence* of the Kula, but – as will especially be shown in the final sections – plays an important role in maintaining and changing its structure.

Three processes will be distinguished in the simulation model: the development of an economic trading network, the spread of peaceful relationships and the evolution of a ceremonial exchange network of Kula valuables. These processes will be systematically linked to model the spontaneous emergence and co-evolution of the Kula Ring.

5. The Methodological Approach

5.1 Aims and limitations of the simulation model

By using a simulation model, we have attempted to account for the development of a trading network and the circular exchange, in which necklaces move in one and armshells in the opposite direction. Intuitive reasoning about the behavior of *dynamic multi-agent, multi-level systems* leads to conjectures, which sometimes may be misleading. It can not offer a stringent proof of what *logically* follows from certain behavioral assumptions and boundary conditions at the meso-level in order to account for the emerging features of the macro-structure. Simulation can demonstrate these logical implications "more geometrico", as René Descartes would have said. This is its main methodological advantage and purpose. Simulation helps map the implications of alternative scenarios, i.e. variations of boundary conditions and behavioral assumptions, and tests the sensitivity of outcomes with regard to (small) variations of input parameters. Of course a mathematical model would be superior, but it is usually too complex to be analytically solvable. This is one of the reasons to use simulation models (Gilbert and Conte 1995; Gilbert and Doran 1994).

However, we do not use simulation as a "computer-assisted thought experiment" only, but try to validate it by comparing its outcomes with empirical data. We investigate which assumptions at the meso-level make a better empirical fit with structural measures at the macro-level. As always in theoretically guided empirical research, this testing is tentative and open to critique. The theoretical assumptions are simplifying abstractions devoid of many details, and the empirical data is often incomplete and unreliable. They might be called "stylized facts".

An important limitation of our analysis is the lack of information about the development of the Kula Ring. We do not have empirical data to describe its historical evolution in order to test our dynamic model in more detail. The "observed" Kula Ring therefore is considered to be the "end-product" of a hypothetical process. We also treat the Kula as a "closed system". Why just these 18 communities became members of the Kula Ring and others remained outside (or left it) is simply unknown.

5.2 Game-theoretical analysis of strategic situations and derived strategies of behavior

The substantive assumptions of our simulation model refer to strategies of behavior of the participating actors. Consistent with our theoretical approach, these behavioral assumptions only refer to dyadically interacting communities and no information beyond distance 2, i.e. one's neighbor's neighbors, is required.

We base our behavioral assumptions on a game-theoretical analysis of (usually dyadic) strategic situations and try to "derive" them from Nash equilibrium strategies. A comment is necessary with regard to this aspect of our simulation model. Our behavioral assumptions refer to the micro-level of individual actors, while the simulation algorithm models the meso-level of island communities in order to derive properties of the evolving macro-structure. Neglecting the internal dynamics of the micro-meso-relationship we take advantage of the well-established empirical fact that all who travel between islands do so as part of a multi-party expedition. Sailing abroad is too dangerous for a single boat, but requires a coordinated effort. Monsoon winds and periods of harvesting determine the times it is feasible at all. Moreover, the strategic situation analyzed by game-theoretic considerations and the distribution of supply and demand are similar for all members of an island community. Mauss provides another, theoretical argument in support of the group approach: "In the systems of the past we do not find simple exchange of goods, wealth and produce through markets established among individuals. For it is groups, and not individuals, which carry on exchange, make contracts, and are bound by obligations; the persons represented in the contracts are moral persons – clans, tribes and families; the groups, or the chiefs as intermediaries for the groups, confront and oppose each other." (1969: 3).

6. The Empirical Data

6.1 The "empirically observed" Kula Ring

The first task in setting up the model is to describe the empirical explanandum. It is extremely difficult, perhaps even impossible, to pin down the real structure of the Kula network because of three reasons. First, whether a stable Kula network existed at all and how it might have changed under the influence of early colonization is questionable and disputed among ethnologists. Second, the most important informants on the early Kula network (Fortune 1989 [1932]; Malinowski 1920, 1966a [1922]; Seligman 1910) had firsthand experience as field researchers only in certain parts of the Melanesian islands. Third, the figures presented and the descriptions given in the texts are often ambiguous and sometimes contradictory, even within the work of the same author. Our "observed" Kula Ring which is based on a systematic survey of ethnographic literature must be considered as a "dense description" of the 36 links existing at the turn of the 19th and 20th century. It treats the Kula exchange among the 18 communities as a closed system and – because of lack of data – is unable to describe its historical development. Figure 1 shows a schematic representation of the "observed" Kula Ring among the 18 Kula communities and the opposite direction of flow of the two Kula valuables: necklaces (soulava) clockwise and armshells (mwali) counterclockwise.

6.2 Empirical boundary conditions

The empirical boundary conditions refer to the geographical distances between the 18 tribal societies and the location where 25 goods were produced or demanded, i.e. consumed but not produced. The distances were measured from the enlarged map of Figure 1, while the latter information was collected from about 470 references in ethnological literature (Ziegler 2007, Appendix). A third boundary condition was the input of Kula valuables at four places: armshells produced from the trocus shell in Kayleula and Woodlark and necklaces made from the spondylus shell in Tubetube and Wari (Malinowski 1966a, ch. XXI; Fortune 1989, p. 202-203; Irwin 1983, p. 58; Leach 1983, p. 23).

6.3 Measures of "Goodness-of-Fit"

In order to evaluate the outcomes of the simulation model several descriptive measures of "goodness-of-fit" were used.

(1) The first and perhaps most fundamental property is the emergence of a *coherent* network. The transaction network should not fall apart into several disjoined networks. In graph-theoretical terms it should form *one strong component*.

(2) Economic exchange presupposes the existence of *peaceful relationships*. Therefore the number of cooperative actors at the end of an iteration is another fundamental measure.

(3) A third basic property is the *degree of need satisfaction* measured by the number of communities able to satisfy all their consumptive needs.

Though we cannot of course expect a perfect fit, we used some measures to indicate the model's overall correspondence with the observed network:

(4) The *density* of the simulated trading network is compared with the observed density. As there are 36 (symmetric) links among the 18 communities the observed density equals (2*36)/(18*17)=.235.

(5) The *similarity* of simulated and observed trading networks is measured by the Jaccard coefficient, which does not take into account the absent ties in both networks.

similarity := a/(a+b)

a = number of links present in both networks

b = sum of links present in only one network

The maximum value of 1 can be reached only if both networks have the same density.

(6) As the model tries to simulate – in a highly simplified and abstract way – a hypothetical historical process, the question has to be raised whether the iteration procedure converges at all towards a (relatively) stable configuration of ceremonial exchange within a coherent transaction network. If – given the boundary conditions and the behavioral assumptions – there are no "fixed points" to be found and the iteration process wildly fluctuates, the model would be seriously flawed. Convergence towards (relatively) stable fixed points is a necessary condition and the *proportion of fixed points* of the ceremonial exchange network within the coherent transaction network is an important indicator of goodness-of-fit.

(7) Scholars have been fascinated by the *circulation* of ceremonial exchange: necklaces clockwise and armshells counterclockwise. From the Massim map of Figure 1 we inferred clockwise and counterclockwise direction among all pairs of communities and defined the following measure:

circulation := (a–b)/(a+b)

a = number of links in which the direction of observed/inferred and

    simulated gift exchange is identical

b = number of links in which observed/inferred

    and simulated gift exchanges are in opposite direction

This measure was calculated separately for both valuables and leads to a scale score of +1 if there is perfect agreement in all links, and –1, if the simulated flow is always in the exact opposite direction to the observed/inferred one.

Besides these relatively strict measures of goodness-of-fit we used other indices to measure different theoretically interesting features of the observed "circular structure" of the Kula Ring. Though the simulated network may fit the observed one poorly it may still possess these – in a way more fundamental – properties, which are necessary conditions of some of the observed ones.

(8) In the observed Kula Ring the two asymmetric networks of gift exchange have the following theoretically important properties: (a) each digraph is strongly connected and forms one single strong component (Hage and Harary 1991: 58), i.e. armshells (or respectively necklaces) may travel from one community to all others, possibly along several different routes. (b) The two ceremonial networks are disjoint. (c) Their union is identical with the symmetric transaction network. A necessary and sufficient condition, that two such digraphs *can* be constructed, is the *absence of bridges* in the symmetric transaction network. (A bridge is a link that, if removed, leads to a disconnected network.)

(9) We separately measured property (8a) by the degree of *reachability*, defined as the percentage of (the 18*17/2=153) pairs of communities, which are mutually reachable in the two asymmetric networks of gift exchange.

The simulation model contains stochastic elements in order to avoid artificial outcomes due to a deterministic sequential algorithm. Therefore it is to be expected that the outcomes will differ even if the iteration process converges towards fixed points, i.e., until in one round everybody presents the same kind of Kula gifts to the same partners as he has done in the previous round. Convergence towards (relatively) stable fixed points is a necessary condition and all goodness-of-fit measures were taken on the basis of the fixed point configurations only. In order to test the stability of the results the iterative process was run for another 250 rounds, after the first fixed point was reached. It did not show complete stability, but the structure changed very gradually and the goodness-of-fit did not deteriorate significantly.

It is common practice in simulation research (Conte and Paolucci 2002: ch. 5; Gilbert and Troitzsch 1999) to report average values (and measures of dispersion) based on a fairly large number of iterations. We use two kinds of averaging procedures to describe the "most likely" outcome of our simulation model. First, we report *mean* values of our fitness measures (and sometimes their range) based on all fixed points reached in 1000 simulation iterations. Second, as our basic assumptions refer to dyadic relationships, for each pair of communities we dichotomize the sum of links between them in all fixed points and code all frequencies above a certain threshold as a link between the two communities in the "*aggregate* simulated Kula Ring", as we call it. The cutting point of dichotomization is chosen in such a way that the density of the aggregate network (approximately) equals the average density of all fixed points. We then calculate the goodness of fit measures of this "*aggregate* simulated Kula Ring".

7. The Three Basic Processes

We first discuss the three processes and report the simulation results of the three modules separately.

7.1 Process 1: Establishing economic trade

Although Malinowski calls the interinsular trade a secondary activity, he makes clear that this is a question of ethnographic description and not of sociological analysis: "Indeed, it is clear that if we look at the acts from the outside, as comparative sociologists, and gauge their real utility, trade and canoe-building will appear to us as the really important achievements, whereas we shall regard the Kula only as an indirect stimulus, impelling the natives to sail and to trade." (Malinowski 1966a: 100)

As said in section 6.2, based on a survey of ethnographic literature the supply and demand of some 25 goods were determined. This information and the geographical distances among the 18 Kula communities are the empirical input to a simulation model of the emergence of a trading network. In each round all actors decide – in random order – whether to sail and whom to visit. Each actor will first visit his nearest neighbor trying to barter with him. A successful exchange takes place if the "double coincidence of wants" is fulfilled, i.e., if both actors have something to offer which the other asks for. If the consumptive demand of a Kula community has not yet been fulfilled it will search at successively larger distances.

The main simulation results are very clear and may be briefly summarized. Each test variant was iterated 1000 times. First, if actors are only motivated by their own consumptive needs *in no iteration* are all Kula communities able to satisfy their needs; moreover the fit with the observed Kula Ring is very bad. Average number of satisfied communities is 8.9 (minimum: 4; maximum: 13); density (.128) and similarity (.178) are very low. 40.1% of the networks are divided in 2 to 4 components and all 1000 simulated networks contain bridges. This occurs though the maximal search radius is 16.6 (minimum: 13; maximum: 17). Second, if people also act as middlemen *all* Kula communities are *always* able to satisfy their consumptive needs. On the average each island has to contact 3 to 7 nearest neighbors only. Average density is .176 and similarity .496. 20.8% of the networks are divided in 2-3 components and 68.5% contain bridges. The process takes about 7.7 rounds until it stops. These results underline the importance of middlemen for the emergence of a bilateral trading network, which has repeatedly been documented in the ethnographic reports.

7.2 Process 2: Establishing social order

As mentioned previously, we hypothesize that the driving force behind the emergence of the Kula to have been the potential advantages of economic trade. However, it is well known that even the simplest economic transaction contains a prisoners' dilemma: both actors are better off if the exchange takes place, but each has an incentive to receive the desired good from the other without delivering his own. When the exchange is not a spot-transaction, the dilemma is sharpened. If one actor has to deliver first and the other at a later point in time, a problem of trust arises.

In an earlier paper (Ziegler 1987), we used that argument, but the economic exchange in the Kula is a spot transaction and the problem of peaceful relations is much more fundamental than the creation and enforcement of a meta-norm "pacta sunt servanda" (Ziegler 1990: 144-149). It is the problem of peaceful social order, i.e. the solution of Hobbes' problem of "Warre, as is of every man, against every man" (Hobbes 1968: 185), or as Mauss has formulated: "In order to trade, man must first lay down his spear. When that is done he can succeed in exchanging goods and persons not only between clan and clan but between tribe and tribe and nation and nation, and above all between individuals. It is only then that people can create, can satisfy their interests mutually and define them without recourse to arms" (1969: 80; see also Granovetter 1985: 488). Wars, looting and cannibalism are frequently mentioned in ethnographic literature and show that Hobbes' problem was quite real among the Melanesian tribal societies in the times before colonial powers and Christian missionaries appeared

(Berde 1983; Chowning 1983; Dalton 1977, 1978; Fortune 1989: Appendix VII; Landa 1983; Macintyre 1983b, 1983c; Malinowski 1966a: 321; Róheim 1954; Seligman 1910: chs. XLI-XLIII; Thune 1983; Young 1983). But even after colonial pacification had occurred, fear of witchcraft by hostile foreign tribes was still widespread (Fortune 1989: 208f).

Refraining from using force or black magic and recognizing property rights is a precondition of peaceful economic trade and presupposes the solution of the basic prisoners' dilemma inherent in "the state of nature" (Buchanan 1975: ch. 4). In the one-shot game, using force is both a dominant offensive and defensive strategy. However, if the game is iterated and "the shadow of the future" is long enough, there will be an incentive for two actors to disarm. The peaceful strategy may spread in a population and become evolutionarily stable (Axelrod 1984, 1997).

Before two actors meet, one of them has to decide whether to sail or not. The game therefore has an *exit option* and the two actors alternate in deciding whether to exit or not. An actor will not sail if he expects the other to deviate. His expectation depends on his experience, his amount of trust, the reputation of his potential host and his fear of ostracism.

It is assumed, that in the beginning all actors use the uncooperative *exit*-strategy ALL-D (i.e. always defecting) but nobody knows anything about the other players. If an actor A has to decide whether to visit another player B and has no personal positive experience about him he will explore B's reputation, which is the sum of expectations of all neighbors of A, who either had direct contact with B or had heard from their neighbors. If the majority opinion is positive, A will contact B, if it is negative he will not. If the majority opinion is split or undecided (i.e., the sum equals zero) A's *own experience* will be decisive. If he himself has no opinion he will visit B if he is *trusting* and will not contact him if he is mistrusting. After an encounter both actors will *update their expectations* depending on whether they have been treated friendly or not. Of course if no contact was made the expectations remain unchanged. An uncooperative actor will eventually *change his strategy* and become conditionally cooperative if the number of his contacts is passing a certain threshold. This assumption models his growing fear of loss of reputation. He will no longer find naïve partners and runs the *risk of being ostracized*.

The results of the various scenarios are very clear and can briefly be summarized. First, without the reputation mechanism working a coherent network develops only in at most 11 out of 1000 iterations and only in a coherent network does peace always prevail, i.e., all 18 communities become conditionally cooperative, and all can satisfy their consumptive needs. On the other hand, if the reputation mechanism is working, always all actors become conditionally cooperative and satisfy their consumptive needs. Second, lack of trust has even more disastrous consequences. The 18 communities are almost always completely disconnected. Third, fear of loss of reputation has a remarkable influence too. If fear of ostracism gets lower a completely fragmented network of uncooperative actors occurs. These results clearly demonstrate the importance of expectations, reputation, trust and fear of ostracism.

7.3 Process 3: Signaling peaceful intentions

The existence of a Pareto-superior *cooperative* Nash-equilibrium presupposes a sufficiently long "shadow of the future", i.e., the best strategy choice (peacefulness or use of force and black magic) depends on the durability of a social relationship. If both actors have a lasting interest, they are both interested in reducing their uncertainty concerning their partner's strategy through a reliable signaling system (Posner 1981: 170; Landa 1983: 152). *It is our central thesis that the ceremonial exchange of gifts is such a signaling system of the kind required to maintain social order, which has inbuilt mechanisms against cheating*.

This interpretation accounts for many peculiarities that may not be understood when the exchange of gifts is thought of as a kind of commercial trade. Ceremonial goods and services exchanged do not have to have use or exchange value (if traded by middlemen), but have to convey clear and unmistakable meanings. Ritualism in exchanging gifts ensures the unambiguousness of signals. Nor does it help to be niggardly. On the contrary, each has to give generously because a signal not being sent does not convey a message or a negative one. Even the pattern of delayed reciprocity now makes sense. To be the first to signal one's lasting interest is by no means disadvantageous, but rather raises one's credibility. Accepting a gift demonstrates the same attitude on the receiver's side. A signal becomes more credible if the counter-gift is of (at least) equal value and is bestowed somewhat later, when the uncertainty about the continuing interest in the relationship has again increased. Its signaling function also explains why there is no haggling, although the gifts are expected to be of equal value. Haggling presupposes social order and the acknowledgment of property rights, while the gift signals the basic choice between peace and war.

But what prevents a dishonest actor from being a "confidence racket" pretending his lasting interest by presenting a gift and then to misusing his victim's trust? It is, of course, the loss of reputation. If his bad reputation would run ahead of him, he would be excluded from the system. However, his interest in remaining in the system is certainly higher than his interest in any specific dyadic relationship. The mechanism of reputation and the fear of being ostracized foster both cooperative and honest behavior.

8. The Simulation Model: Coupling the Three Processes

The three processes are linked to simulate the co-evolution of the economic and ceremonial exchange system. Though in the beginning the gains from economic trade are considered to be the driving force of the development, establishment of peace is a necessary condition for economic exchange to take place. Only two cooperative actors will barter and exchange goods and services if the double coincidence of wants is fulfilled. In turn the reputation mechanism induces uncooperative actors to change their strategy because of fear of being ostracized. Both reputation and trust are necessary in order that ceremonial exchange of gifts fulfills its signaling function. However, signals are only sent if successful trading creates a lasting interest. Once Kula partnerships are established, they will be given priority irrespectively of geographic distance when exploring possibilities of trading. Figure 2 presents a schematic view of these interdependencies between the three basic processes.

In its baseline form, the model does not reproduce the observed circulation of the two Kula gifts satisfactorily and accounts only for part of its main theoretically interesting features.

Distinguishing among different phases in the "historical" development leads to a substantial improvement in the goodness-of-fit. Malinowski himself put some conjectures forward. In chapter XII of his book on the "Argonauts of the Western Pacific", he describes several myths about the Kula and its related magical practices. It is important to note that these myths only refer to certain Kula communities in the Western part of the Kula Ring. Malinowski conjectured that other communities joined the Kula at a later time. In addition he pointed to an "anomaly" in the observed circulation of valuables: "... the Tubetube people import armshells into Murua (this is Woodlark – RZ), thus bringing coals to Newcastle, while the Muruans bring the necklaces to Tubetube and Wari, that is, to the points at which the necklaces flow into the ring from the outside." And he adds: "These considerations are important for anyone who would like to reflect on the origins, or history of the Kula, since the natural movement of valuables was no doubt the original one, and the Western half of the Kula from this point of view appears to be the older." (Malinowski 1966a: 508)

Taking up this idea, the process is first restricted to a subset of nine Kula communities in the western part of the region. In the second phase the possible link between the two islands farthest apart (Tubetube and Woodlark) is "exogenously opened" and the process is iterated in this "primordial or UrKula Ring" (Hage 1977: 33; Hage and Harary 1991: 172-173) until it converges at a fixed point. In a third phase, the remaining communities are included and the process goes on until a fixed point is reached in the total network. During this phase 3, the members of the Urkula stick to their traditional way of exchanging Kula gifts among themselves, which they established at the end of phase 2. We thereby assume that patterns of behavior that developed and became evolutionary stable in a subsystem are ritualized. People adhere to their "tradition" even under changed circumstances, i.e., when the network is enlarged.

Of course the three historical phases distinguished are highly stylized. To treat them as empirically well-founded boundary conditions would ask for more historical evidence than is available. However, the main purpose of these test variants is to show the implications of varying assumptions. As already said intuitive reasoning may lead to conjectures, but it is unable to prove what follows logically from certain assumptions about the dynamic behavior of an interdependent multi-agent, multi-level system.

This version of the baseline simulation model with historical phases produces a reasonably good fit: 29 out of the 36 observed trading relationships are contained in the simulated aggregate Kula and in 28 out of the 37 simulated trading relationships the direction of circulation of armshells and necklaces is correctly predicted.

Actually the process is path-dependent. If one looks at the distribution of the similarity scores over the 982 fixed points, a bimodal pattern emerges (see Figure 3). A "bi-furcation phenomenon" is observed, which strikingly contrasts the unimodal distribution of the basic model (dotted line). If, at the end of phase 2, the process tends towards the observed exchange pattern in the primordial Kula (solid line) – this occurs in 60.8% of the fixed points –, their mean similarity at the end of phase 3 is +.395, and the similarity score of the aggregate Kula Ring is +.622. If, on the other hand, the simulated primordial Kula is the mirror image of the observed one (dashed line), the mean similarity of the fixed points at the end of phase 3 is –.340 and the similarity score of the aggregate Kula Ring is –.676. Also many more pairs of communities are mutually reachable at the end of the simulation – i.e., armshells and necklaces may be transported from one community to all others and vice versa –

which is an important property of a ring-like structure. Mean value of baseline model is .483 as compared with .690 of the model with historical phases. With regard to this property, the improvement is even more noticeable as far as the aggregate Kula ring is concerned. After an Urkula with positive circulation measures the index indicates a perfect fit (1.0), i.e., every community can reach all others.

These simulation results indicate that the observed circulation of the exchange − necklaces clockwise and armshells counterclockwise − is to a very large extent a *historically contingent* phenomenon, but not the emergence of a network-wide system of gift exchange itself, where in each dyadic transaction armshells and necklaces are exchanged reciprocally.

9. A Counterfactual Scenario

A simplifying assumption of our simulation model has been that only two valuables are being exchanged. In the ethnographic literature it is pointed out that the two kinds of *vaygu'a* are culturally associated with the male-female distinction. Though this certainly is a factor explaining the continued use of only two valuables, it seems unlikely that it played a decisive role in the early starting phase. One advantage of simulation studies is that one can test the implications of the counterfactual assumption that three valuables are exchanged. The results of this simulation scenario were strikingly different. While so far, in 95% of all 1000 iterations in the baseline model the process converged on a fixed point, not a single iteration of the simulation model with three valuables stabilized at a fixed point. Of course these simulations do not tell us anything about the actual historical development. However, they demonstrate that the behavioral assumptions and boundary conditions of our model with two *vaygu'a* are compatible with a stable configuration of ceremonial exchange while the same model with three valuables is not.

10. What Happened to the Kula Ring?

One could presume that after the peace-keeping Leviathan of the colonial powers appeared, after the Christian missionaries indoctrinated a new value system and after the importance of the interinsular barter declined, an efficient signaling system would have become obsolete and that the Kula Ring would therefore have broken down. However, the stocktaking at the international conference of Kula experts in 1978 (Leach and Leach 1983; Macintyre and Young 1982) showed that the Kula still existed at that time, though to the great regret of older clan members some of the young men would not go on expeditions with traditional canoes, but instead with motorized fishing boats.

But the geographical shape had changed. A comparison of the historical Kula Ring with the Kula in the 1970's shows that five communities had left the Kula Ring: East Cape, East End Islands, Wari, Misima and Laughlan. Several other links had been cut as well. It is argued that prestige competition was the decisive factor explaining the persistence and change of the Kula Ring after its peace-keeping and economic functions had declined. Therefore, it is to be expected that if communities leave the Kula, it will be those, which have a lower chance of acquiring Kula valuables due to their structural position in the network. It turned out that the five communities which had left were less favorably placed in the historical Kula Ring. Their peripheral position had lowered their chances of acquiring Kula valuables. A comparison of the centrality measure of the communities clearly shows that the least central communities left the Kula during the years after the First World War.

11. Limits and Future Directions

Though we have stressed the signaling function of the ceremonial exchange this is of course not to deny the obligatory character, the great symbolic importance and the status-enhancing function of the Kula which have been well documented by the ethnographers. We only argue that the signaling function is part of the starting mechanism and that the other functions presumably develop later after the exchange of valuables as signals of peaceful and lasting relationships among former strangers has come into being and trading relations have been established. The continued existence and change of the Kula Ring in the last century after these incentives had disappeared certainly has to be attributed to the status enhancing function of the Kula exchange. It would be a challenging task to include this process into the simulation model and to compare its predictions regarding stability and change of the Kula Ring in more recent times with the available empirical data.

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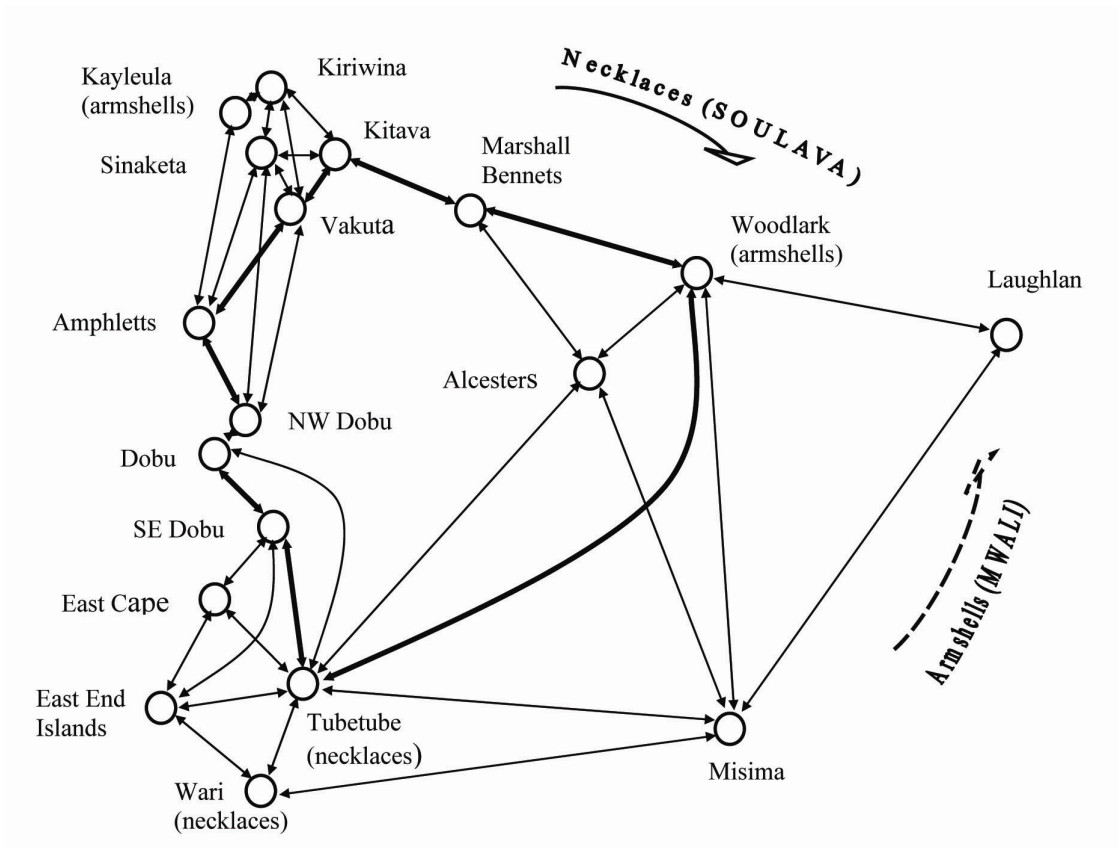
Figure 1. Schematic representation of the "Observed" Kula Ring

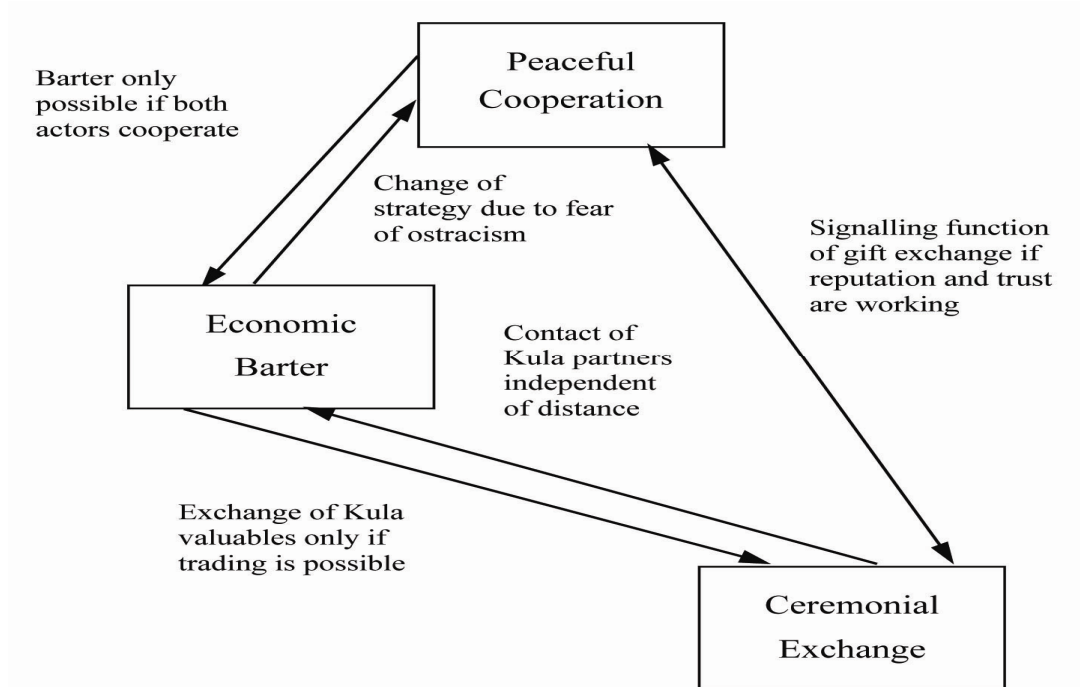Note: Bold arrows indicate the UrKula Ring

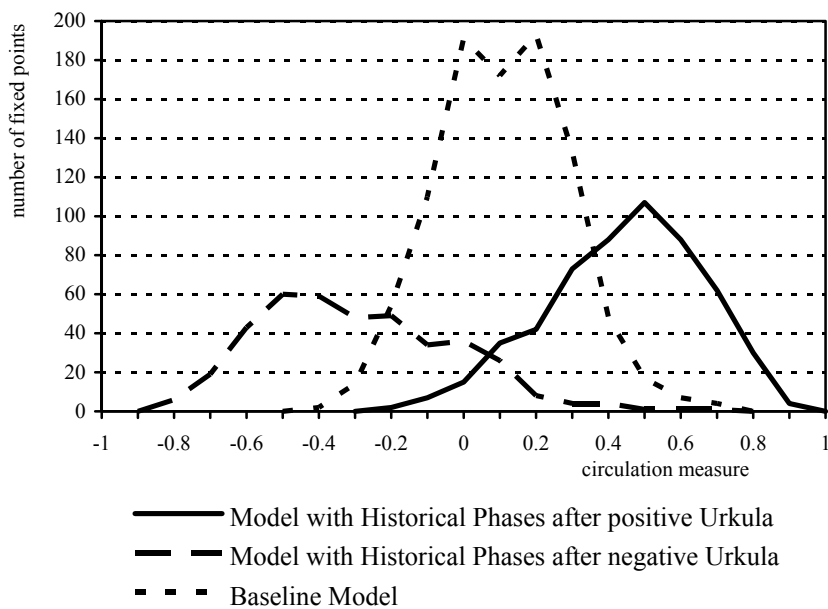Figure 2. Coupling of the three basic processes

Figure 3. Distribution of circulation measures of model with historical phases and of baseline model

Note: Circulation measures of baseline model (945 fixed points) and of model with historical phase (982 fixed points) at the end of phase 3, after Urkula was predominatly positively or negatively oriented