Self-image and the Emergence of Brand Loyalty in Networked Markets

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Abstract. Brand loyalty consists of a consumer's commitment to repurchase or otherwise continue using a given brand and is demonstrated by repeated buying of a product or service, or other positive behaviours such as word of mouth advocacy. Standard models of the emergence of brand loyalty consider the behaviour of autonomous individuals who are essentially reacting to the objective attributes of the brand. Here, we show that brand loyalty can be regarded as a social construct, which emerges when the fundamental psychological principle of self-image is combined with agents reacting to each others' decisions in social network markets. Brand loyalty can emerge even when agents find it hard to distinguish between brands in terms of their objective attributes. We illustrate the principles in the context of the well-known model of binary choice with externalities. We endogenise the behaviour of agents using the principle of self-image, and illustrate the consequences in situations where consumers face not a one-off choice of adopting or not adopting, but a chain of mutually dependent decisions about complex products over a period of time.

Keywords: brand loyalty, self-image; evolving thresholds; cascades, binary choice with externalities.

1 Introduction

Brand loyalty consists of a consumer's commitment to repurchase or otherwise continue using a given brand and is demonstrated by repeated buying of a product or service, or other positive behaviours such as word of mouth advocacy. It is key concept in marketing.

In this paper, we consider the emergence of brand loyalty in situations where consumers face not a one-off choice of adopting or not adopting, but a chain of mutually dependent decisions about complex products over a period of time. So, for example, in electronic consumer durables, over a relatively short period of time, an agent may face the choice to buy or replace his or her cell phone, personal computer, MP3 player and so on.

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We analyse the emergence of brand loyalty when consumers use the behavioural choice heuristic of copying, combined with the fundamental psychological concept of self-image. Here, we show that brand loyalty can emerge regardless of the objective attributes of the alternatives choices available to consumers.

In section 2 we set the question in context and motivate the model. Section 3 describes the model and section 4 presents results and a brief discussion.

2 Background and Model Motivation

In the marketing literature, there are two very influential models of the process by which brand loyalty emerges. These were developed by Aaker [1] and by Dyson, Farr and Hollis [2]. (For convenience, we refer to these as A and DFH below). Both these models are based upon a pyramid structure, through which the loyalty of a consumer may evolve, with the most committed, the most loyal, to a brand being at the top of the pyramid.

Although there are differences between the two approaches, they have several important principles in common:

- Marketing efforts are required in order to get the consumer into the bottom layer of the pyramid
- Progression through the middle layers of the pyramid depends upon the objective attributes of the brand
- Emotional commitment to the brand only occurs at the higher levels of the pyramid

So, for example, in the DFH model, the bottom layer of the pyramid is designated as ‘presence’, which indicates that the consumer is aware of the brand. This awareness is achieved by, for example, advertising or by making the brand available at a wide range of outlets. In the A model, this layer of consumers are referred to as ‘switchers’ and marketing activity is required to raise brand awareness, a necessary condition of a consumer moving further up the pyramid.

In this latter model, the middle of the pyramid is occupied by ‘satisfied buyers with switching costs’. These consumers are satisfied with the brand, and realise that switching incurs costs, either in terms of time or money, or in reduced quality. They perceive the quality of the brand to be better than the market average. At level 3 of the DFH model, ‘performance’, the attributes of the brand need only be as good as those of the market average, although to progress to the next level, ‘advantage’, consumers need to be convinced that its qualities are superior to the average. In both the models, the attributes of the brand are important.

Finally, at the highest levels, an emotional bond develops between the consumer and the brand. In the DFH model, consumers can in fact progress to the highest level if they have a strong rational belief in the superiority of the brand over its competitors, but emotional belief can bring about the same behavioural effect. In the A model, emotional benefits are associated both with level 4 (‘brand likers’) and the highest level, 5 (‘committed buyer’).

Many modern products are often complex and difficult to evaluate, even when large amounts of information are available in the form of expert reviews in specialised journals, consumer reviews on the internet and so forth. This is especially the case with markets created by new technologies, developing a stream of products which hitherto did not exist. In such circumstances, it may be very difficult for the consumer to differentiate between products in terms of their attributes

Consumers in such circumstances often pay attention to the decisions of others and use these as the basis of their own decisions, rather than attempting to evaluate the objective attributes of the product. They may, for example, do so either because they have limited information about the problem itself or limited ability to process even the information that is available. Simon, in an article which is the foundation for all modern developments in behavioural economics [3], argues that such circumstances may obtain in many actual circumstances.

Hauser [4] suggests that it is ecologically rational in many circumstances for consumers to use simple heuristics as a basis for decision making. The heuristic principle of making a choice by copying the decisions of others is well established empirically in a range of areas such as popular culture, financial markets and crowd behaviour. Evolutionary anthropologists and psychologists (for example Dunbar and Shultz in 2007[5]) have argued that that the anomalously large brain (neo-cortex) size in humans evolved primarily for the purposes of copying, or social learning as it is referred to in this context.

Schelling [6] offers a classic exposition of a copying heuristic, which he refers to as being one of ‘binary choice with externalities’. ‘Binary choice’ means a situation in which a consumer faces one of two alternatives, in this instance being the choice to buy or not to buy a particular brand. ‘Externalities’ mean that the decision of any given consumer may have consequences for the decisions of others. If a consumer decides to buy the brand, for example, then other consumers may also decide to buy it.

It is a fundamental insight of psychology that the self represents the primary structure responsible for decision making and action ([7]; [8]; [9]; [10]). The regulatory function of the self is governed by several principles, of which self-enhancement and self-verification are regarded as the most important (for example, Martin and Tesser [11]). Self-verification (self-consistency) describes the tendency of people to act in a way that is consistent with their self-image.

The classical notion of cognitive dissonance [12] is interpreted as a tendency to avoid beliefs or actions that are contradicting opinions held with respect to the self [13]. Confirming the self-image or the self-view represents an important motive of human behaviour as put forward in self-verification theory [14]. People have a strong tendency to act in a way consistent with their self-views. According to self-perception theory [15] individuals under conditions of uncertainty build their self-view by observing their own behaviour.

Here, we combine the concept of binary choice with externalities and the psychological concept of self-image. We show that in very general circumstances, brand loyalty emerges even when consumers, by deliberate assumption, do not attempt to evaluate the attributes, real or perceived, of the brand, but base their decisions solely on the principle of copying/social learning.

Marketing activity remains important, indeed in some ways its importance is enhanced compared to its role in the classic models of brand loyalty referred to above.

But the heuristic of copying/social learning combined with the evolving self-image of the individual is sufficient to explain the emergence of brand loyalty over a sequence of mutually dependent decisions.

3 Model Specification

The basic model which we use endogenises the behavior of agents in the context of the well-known model of binary choice with externalities (op. cit. [16]). *N* agents are connected on a network. The agents can be in one of two states of the world (0 and 1 for purposes of description), and initially all agents are in state 0. To start, a number of agents are chosen at random as 'seeds' to switch to state 1. Each agent is allocated a 'threshold' drawn at random from a uniform distribution on [0, 1]. The agents are therefore heterogeneous in behavior. But the thresholds, once drawn, are fixed. An agent switches from state 0 to state 1 according to the state of the world of the agents to which it is connected. If the proportion of these which are in state 1 exceeds the threshold of the agent, the agent also switches to state.

The literature on this, and related models, makes the assumption that the behaviour of agents is time invariant. In many practical contexts, agents do not face a purely one-off decision of, for example, whether or not to buy a new consumer product, but instead encounter a sequence of such decisions over time.

The behaviour of agents, the nodes of the networks, in such situations is not time invariant, but evolves over time in ways which are based on their previous decisions. The principles of our analysis of endogenous, dynamic node behaviour are built on well-established, fundamental principles of psychology.

The concept of the self-image implies that the attitudes of agents towards adoption to evolve in ways which depend upon the previous decisions of the agent on adoption. At one level, this could be thought of as amounting to simply saying that agents have a memory of what they done previously. Whilst this is obviously true, the statement does not give any scientific basis for determining how agent behavior is affected by memory. Several rules could readily be written down on a purely *a priori* basis. However, the fundamental psychological concept of self-image provides a clear, empirically grounded for how agent behavior evolves with respect to previous decisions. If an agent adopts an innovation, he or she is more likely to adopt the innovation the next time he or she is confronted with this choice. The self-image of the agent towards adoption has been altered, in a specific way. Nowak [17] show that the agent's concept of self leads to very different distributions of cascade sizes than those observed when the standard assumption is made that agent behavior is fixed.

We initialize the model as described above, and obtain a solution in the standard way. A proportion, π, switch to state 1 of the world. This solution corresponds to the situation where a new technology is introduced, and agents decide whether or not to adopt a particular brand of the technology.

During the course of a solution when an agent is called upon to make a decision, if it does not switch to state 1 i.e. purchase the brand, it sees itself as less willing to adopt products of that company in future, and it therefore increases its threshold. Similarly, if an agent switches it sees itself as more willing to switch or adopt and its threshold is reduced. The rule for adjusting thresholds ensures that they remain bounded in [0, 1]. If an agent is not called upon to decide, which is often the case in situation where the cascade size, π, is small, its threshold remains unchanged.

More formally, the adjustment to the threshold of an agent is made as follows. Denote the existing threshold of an agent by α. If the agent switches, in the next solution its threshold is set at a value drawn at random from a uniform distribution on $[(\alpha - \beta\alpha), \alpha]$, where β is an input parameter to the model and $0 \leq \beta \leq 1$. The results are robust with respect to the assumption of a uniform distribution, which is the most convenient to implement. With the assumption of a normal distribution, for example, we have to impose over-rides to prevent the threshold from falling below zero or rising above 1. If $\beta = 1$, for example, then the new value is drawn from the range $[0, \alpha]$. The higher the chosen value of β, the more sensitive are agents to their choice not to switch. If the agent does not switch, in the next solution its threshold is increased to a value drawn from a uniform distribution on $[\alpha, (\alpha + \beta(1 - \alpha))]$, so again if $\beta = 1$, the draw is made from the range $[\alpha, 1]$. In the standard models with fixed thresholds, $\beta = 0$ of course.

We then re-initialize the model, with all agents again in state 0. This corresponds to the situation in which the company introduces the next variant of the technology, in the way, for example, that the cell phone and smart phone markets have evolved. There are, however, two fundamental differences to the standard model of binary choice with externalities:

- the thresholds are no longer distributed at random, but take the values which emerge during the first solution of the model
- the seeds are not drawn completely at random, but with a bias towards those who adopted the brand in the first solution

In terms of the latter point, an agent is drawn at random, and is checked for whether or not it adopted (i.e. was in state 1 of the world) in the initial solution. If it did, it becomes a seed. If not, another agent is drawn at random and the same checking takes place. This task is carried out $2N$ times, where N is the number of agents. If the required number of seeds has not been found, then the remainder is selected at random. This process is realistic in that agents which purchase the first version of the brand are more likely to purchase the second, given that the initial values of their thresholds are reduced. However, it does not bias the solution too strongly, which could possibly be the case if seeds were only chosen from those agents which adopted during the first solution of the model.

We repeat the process ten times. In the results described below, we set $N = 1000$, β which was a random number from a uniform distribution from 0 to 1, and in the first solution the thresholds are drawn at random from a uniform distribution. We consider three random networks in which the probability of any pair of agents being connected is, respectively, 0 (not connected agents), 0.01, and 0.10. The qualitative nature of the results is robust with respect to these assumptions [17].

We examine results in which the number of seeds is 20 and 100. These can be thought of as corresponding to situations in which the initial marketing effort varies, acquiring only 2 per cent of potential consumers in the former case, and 10 per cent in the latter.

The whole process described above is repeated 1,000 times.

4 Results and Brief Discussion

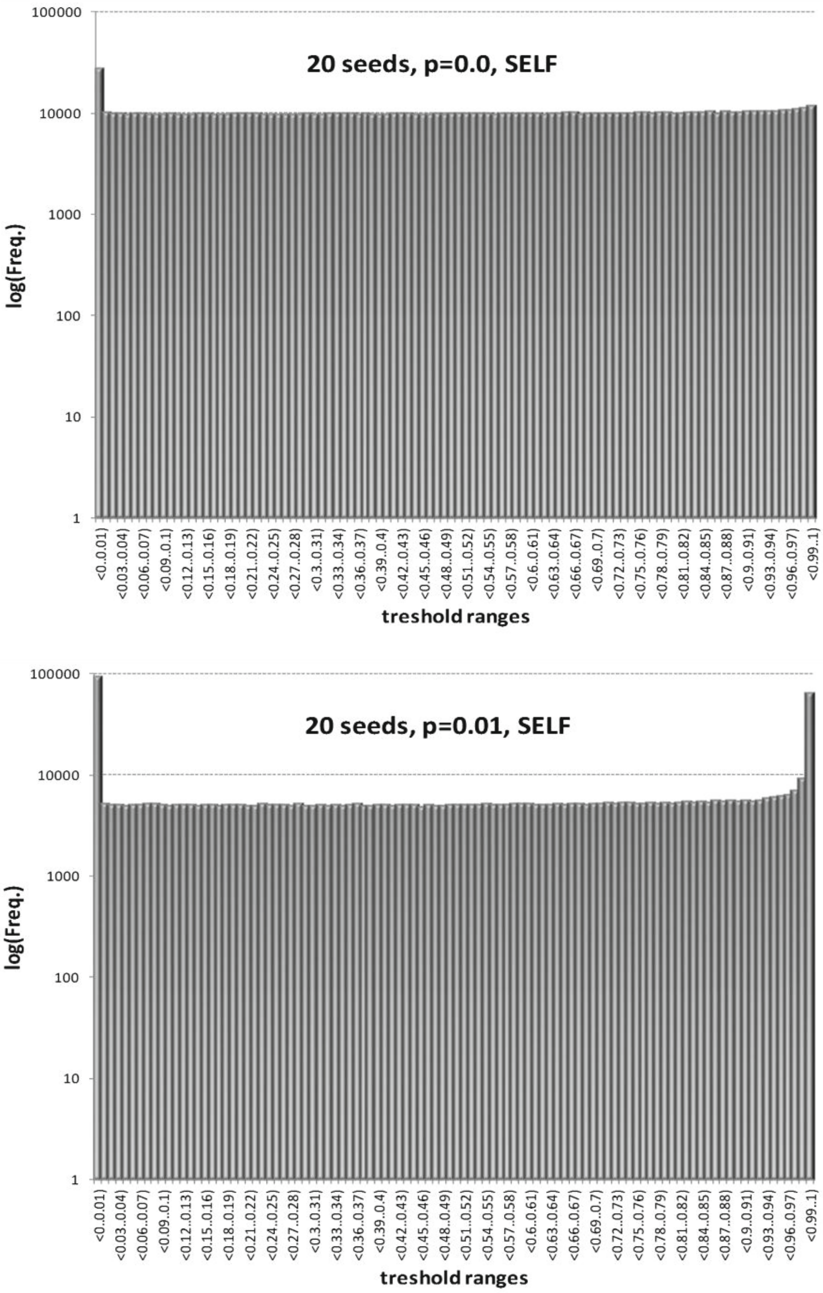
The thresholds of agents, indicating their willingness to be persuaded to purchase a particular brand, initially follow a random uniform distribution in [0, 1]. These are endogenous to the model, based upon the principle of the self-image of the agent. We examine how these evolve during the process of ten successive variants of a brand being introduced.

A very general feature of the results is that a group of agents emerges with thresholds which are very close to zero. In other words, they become willing to adopt the next variant of the brand almost regardless of the behavior of the agents to which they are connected on the network. Only when literally none of their social network purchases the current variant of the brand will they not adopt it. This is the case even in densely connected networks when the probability of any given pair of agents being connected is 0.1. Equally, during this process of evolving thresholds, a group of consumers emerges which is very resistant to subsequent purchases of the particular brand.

This phenomenon takes place even though, by assumption, no attention is paid to the attributes of the brand. As noted in the Introduction, the main approaches in the marketing literature to the emergence of brand loyalty do require consumers to relate to the objective qualities of the brand. We are not saying that in practice consumers pay no attention to these at all. However, brand loyalty emerges even in situations when brands are difficult to compare in terms of their attributes. As we noted above, many new technology products such as smart phones exhibit these characteristics.

The results suggest that brand loyalty is essentially a social construct, in which social network market effects [18] combined with the psychological principle of self-image are the key factors). Marketing activity remains important, indeed in some ways its importance is enhanced compared to its role in the standard models of brand loyalty. But the heuristic of copying/social learning combined with the evolving self-image of the individual is sufficient to explain the emergence of brand loyalty over a sequence of mutually dependent decisions.

Figures 1(a) to (c) plot the results across 1,000 solutions, where each solution consist of 10 decisions to adopt the product of the same brand, with networks of different degrees of connectivity with 20 seeds in each solution, and Figures 2(a) to (c) show the results with 100 seeds. In each case, a group of 'brand loyalists' emerges. But the results suggest that the initial marketing effort does have an important effect on the overall outcome of the process. This effect gets stronger with higher network connectivity.



a

b

Fig. 1. The final distribution of thresholds after 10 adoptions for networks of 1000 agents and 20 seeds. Figure 1a corresponds to no connections, 1b to the network average density of 10 connections per individual, and 1c to the average network density of 100 connections per individual. The frequency is displayed on a logarithmic scale. Simulations involved 1000 agents and 1000 repetitions, so each graph shows distributions of 1 000 000 thresholds**.**

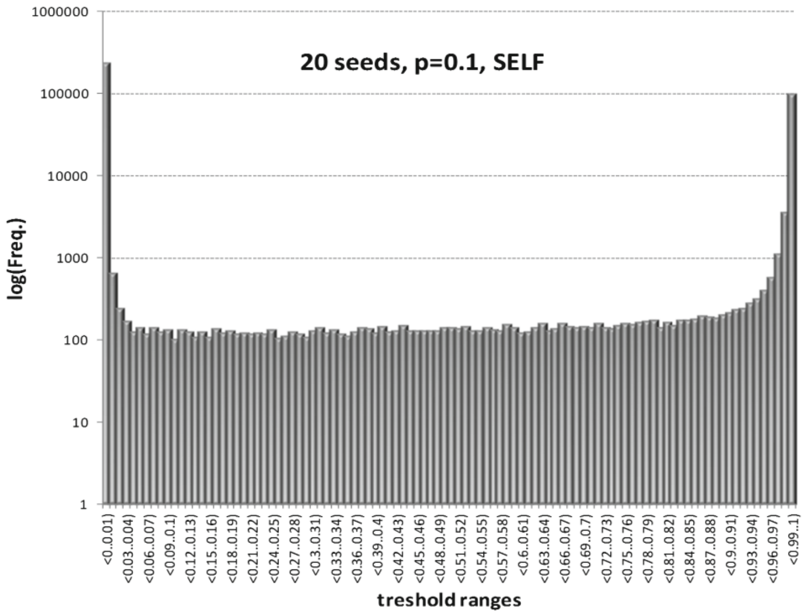


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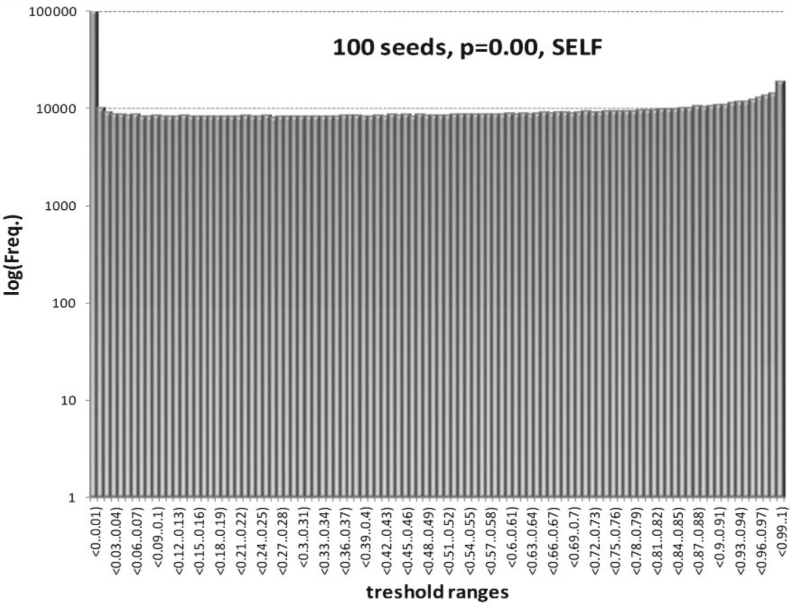
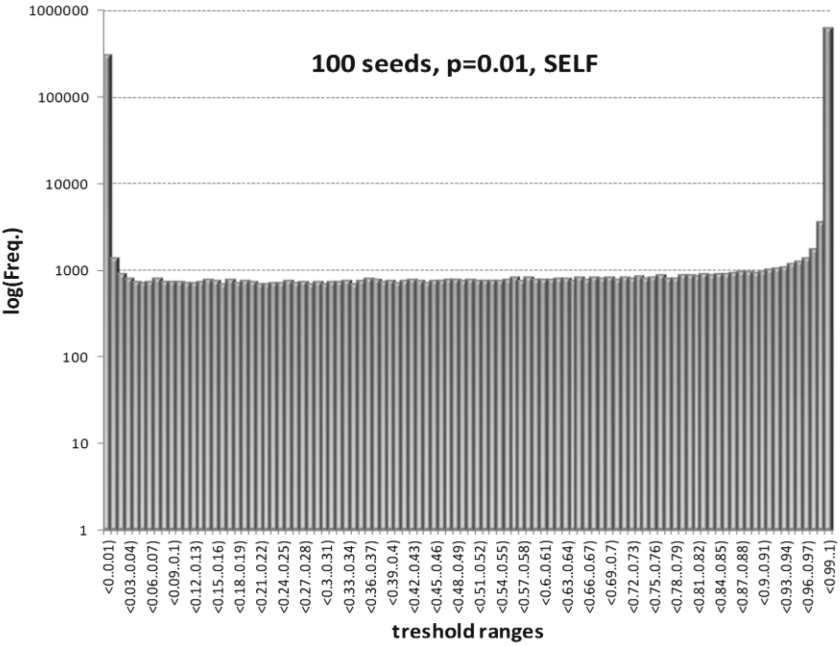
Fig.1. *continued*



a

Fig. 2. The final distribution of thresholds after 10 adoptions for networks of 1000 agents and 100 seeds. Figure 2a corresponds to no connections, 2b to the network average density of 10 connections per individual, and 2c to the average network density of 100 connections per individual. The frequency is displayed on a logarithmic scale. Simulations involved 1000 agents and 1000 repetitions so each graph shows distributions of 1 000 000 thresholds.



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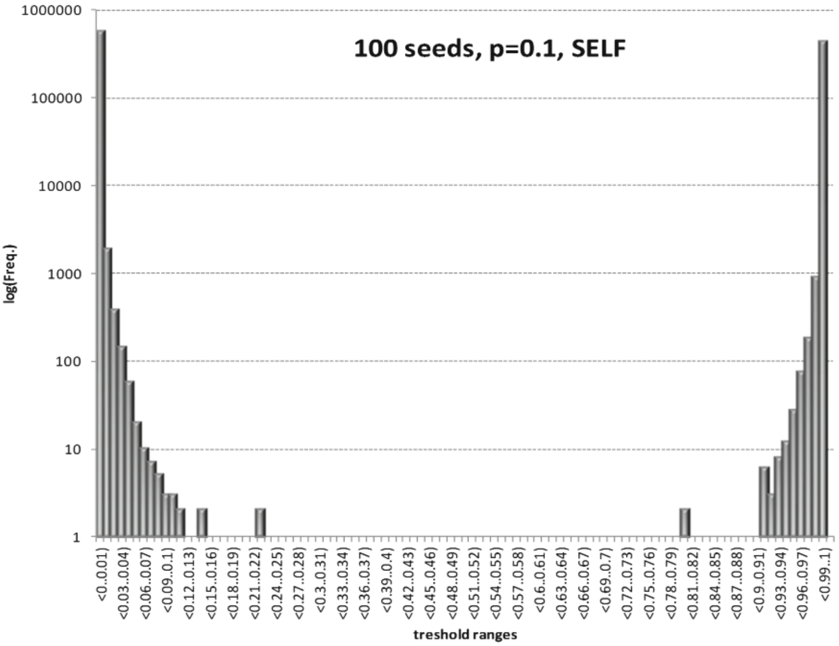

c

Fig. 2. *continued*

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