

Context and structure in conceptual change: students' understanding of price

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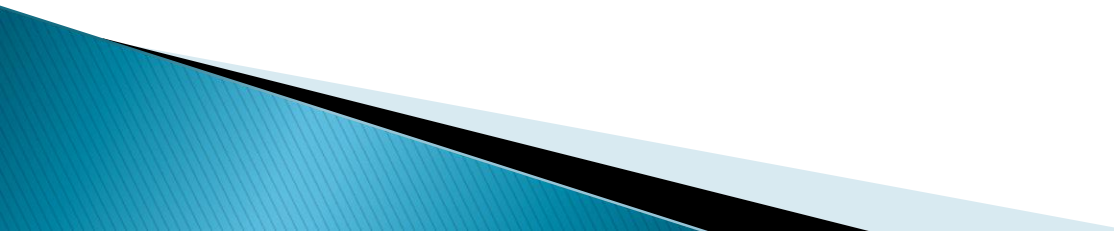
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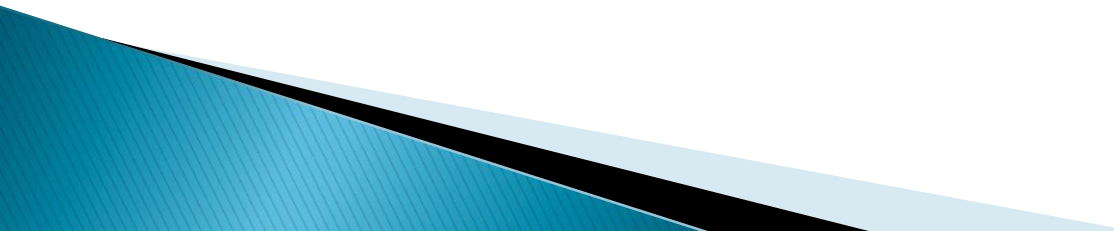
The propositions in this paper

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 - 2 Previous research on students' understanding of price is a good place to start to examine this proposition.
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Three propositions in this paper

- 1 Students' progress in economics depends critically on profound shifts in their conceptual structure (not just on accumulation of knowledge, individual concepts or modes of reasoning).
 - 2 Previous research on students' understanding of price is a good place to start to examine this proposition.
 - 3 **But** previous research has failed to identify critical differences between students' conceptions of supply and demand.
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The Received Categorisation of students' conception of price

Conceptions of Price

- 1 In terms of reflection of intrinsic nature or quality
- 2 In terms of the demand for the product
- 3 In terms of the supply of a product
- 4 In terms of the supply and demand for a product

References: Dahlgren (1984), Pong, (1999), Pang and Marton 2003, 2005, 2008)

– And exactly the same in research undertaken by Social Psychologists – e.g. Leiser and Halachmi (2006)

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BUT... Whilst the Social psychology tradition suggests that Children aged 12 typically develop a conception of price in terms of Supply and Demand....Phenomenographic Research suggests otherwise...

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BUT... Maybe this is because 'price in terms of supply and demand is interpreted differently by different researchers...

The theoretical problem with this categorisation

Conceptions of Price

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- 2 In terms of the demand for the product
- 3 In terms of the **supply** of a product
- 4 In terms of the **supply and demand** for a product

If it is possible to identify qualitative differences between students' conceptions of price it must also be possible to identify qualitative differences in conceptions of supply

Conception of supply		
1 Selling		
2 Covering cost: selling more lowers cost, therefore lower price (on the bulk-buying principle)		
3 When costs to all suppliers in the market rise or fall they will change their price		
4 If the price that consumers are willing to pay rises then suppliers will provide more because it would cost them more to provide more		

Conception of supply	Context	
1 Selling	An individual business	
2 Covering cost: selling more lowers cost, therefore lower price (on the bulk-buying principle)	An individual business	
3 When costs to all suppliers in the market rise or fall they will change their price	The market	
4 If the price that consumers are willing to pay rises then suppliers will provide more because it would cost them more to provide more	The market	

Conception of supply	Context	Causation
1 Selling	An individual business	Price fixed by seller to maximise profit (assumes constant cost)
2 Covering cost: selling more lowers cost, therefore lower price (on the bulk-buying principle)	An individual business	Price fixed by seller to break-even (assumes constant demand)
3 When costs to all suppliers in the market rise or fall they will change their price	The market	From Supply to Price
4 If the price that consumers are willing to pay rises then suppliers will provide more because it would cost them more to provide more	The market	From Price to Supply

Conception of supply	Context	Causation
5 Firms will change their prices in response to cost changes and they will change what they offer for sale in response to changes in market price	The market	From Supply to price and from price to supply
6 If there are good profits to be made in a market firms will leave one market and move in to increase supply	Interacting markets	From supply to price and from price to supply in different markets
7 If there are not many firms in a market, competition will be low and firms will charge a lot more than their costs	market structure	From conditions of market supply to price setting by individual firms

This suggests different possible changes in conceptual change (e.g. in a change from 'price in terms of supply to price in terms of supply and demand')

Type of Change	Change in Conception of Price	Change in Conception of Supply
Component Relations	From Supply to Supply and Demand	No Change in Conception of Supply
Component Reconfiguration	From Supply to Supply and Demand	Change in Conception of Supply
Theoretical Re-Framing	Causal attribution through a theoretical framework	Change in Conception of Supply

Proposition: That the kind of integration of thinking which is sought by teachers of disciplines such as economics requires Theoretical reframing, The route for students towards this reframing involves learning to use partial models (or narratives) from the subject and the modes of analysis which are used to construct these narratives and the theoretical framework

Type of Change	More typically associated (Davies and Mangan 2007) with
Component Relations	Move from naïve to disciplinary categories
Component Reconfiguration	Learning to use disciplinary procedures
Theoretical Re-Framing	Learning to use threshold concepts

Method

1. First Year Undergraduates (10) from 3 English Universities.
2. Written task to be completed in students' own time before interview
3. In-depth interviews (25–50 minutes) taped and transcribed
4. Matching problems task. 14 short problems – categorise them e.g.

1 A leisure company which owns a chain of pubs which are currently struggling to break even is trying to decide whether to sell the pubs and put the money into expanding its chain of profitable casinos.

2. A petrol station has noticed that other petrol stations in the local area have increased their price of a litre of petrol by 5 pence and are deciding whether or not to raise their price as well.

Method

4. Provide written answer to these problems:

The number of pubs in a small town falls by 40% over a period of three years. What do you think is likely to be the effect on the costs experienced by the remaining pubs in the town?

Planners in an urban want to see an increase in the number of car parking spaces available. If the number of car parking spaces increased by 25% how would this be likely to affect the cost of providing each car parking space?

A large urban area has a tram system and a well developed road system. The planners in this area want to reduce the number of 'unsatisfactory journeys' by changing the price charged to transport users. What should the planners do with prices to achieve their objective?

Results: A separation between conceptions of price and cost

Matching Problems (Please put the problems into categories using the space below—choose however many or few categories as you wish)

4. A hairdresser in a town centre experiences a sharp increase in the annual rent it has to pay for the property. It has to decide whether to increase its prices.

Results: A separation between conceptions of price and cost

Robert And then four (Problem 4) is more of an internal problem, in the sense that it's got nothing to do with what a hairdresser down the road is doing.

Interviewer Why has it got nothing to do with the hairdresser down the road?

Robert Because it's about their rent has increased, so their costs have increased and now it needs to decide whether to increase its prices to counterbalance that. I guess that it would have an impact on what their demand was if they were competitors, but I think it's more a sense of what they need to do to break-even, with the increase in cost.

Results: A separation between conceptions of price and cost

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Interviewer Why has it got nothing to do with the hairdresser down the road?

Robert has devised his own way (internal/external) of framing situations to make them tractable – his 'commonsense frame?

...but their rent has increased, increased and now it needs to increase its prices to guess that it would have an demand was if they were it's more a sense of what break-even, with the increase

When challenged he quickly owns up to what he is doing, but sticks with it

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And refers to a specific narrative he is using (although this is from Business Studies, not Economics)

Results: Robert's response to problem 1

Robert Well because there's more demand, you'd expect them to obviously have more customers and more, so they'd be getting more in, but then because they've already got the fixed costs covered, things like they've got the premises and they've got, obviously some staff they'd have, so they'd be able to cover quite a lot of the increase, probably without raising costs at all, so some may not have to, but then if the demand was so high that they had to cover the increase in customers and they'd have to spend a little bit on obviously extra wages...they may see a slight fall in costs, on say things like purchasing beer, 'cause obviously they'd be able to buy slightly more, they might get bit slightly cheaper, but I wouldn't say that's a substantial change.

Results: Robert's response to problem 1

He starts with demand, not costs

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Results: Robert's problem

He starts with demand, not costs

He approaches the problem through 'fixed and variable costs' in line with use of a 'break-even' model

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He takes it for granted that if 40% of the other pubs have closed, then customers must now be transferring to the remaining pubs

But he is thinking in terms of totals –not averages, because average fixed cost would fall as output increases

response to

And the only idea he uses to think about the relationship between costs and increasing output is 'bulk buying' (a common sense fragment)

*And if demand, you'd expect more customers and more, so they'd be getting more in, but then because they've already got the **fixed costs** covered, things like they've got the premises and they've got, obviously some staff they'd have, so they'd be able to cover quite a lot of the increase, probably **without raising costs at all**, so some may not have to, but then if the demand was so high that they had to cover the increase in customers and they'd have to spend a little bit on obviously extra wages...they may see a slight fall in costs, on say things like purchasing beer, 'cause **obviously they'd be able to buy slightly more, they might get bit slightly cheaper**, but I wouldn't say that's a substantial change.*

Results: Robert's response to problem 2

Robert If you're saying the planners are sort of going to get 25% more, they'd have to obviously hire people to create spaces or change the land or paint, whatever you have to do. Again I think that's more like the bulk of it. If you ask them to do more, it'll be slightly cheaper and I don't know. I'm really not **sure...but sort of a sense of, like the first one, if you bulk buy, you're likely to get a cheaper rate on it**

Interviewer So how does that work in relation to what you might have to buy?

Robert I'm not really sure, 'cause you can't buy on land, especially if it's owned by the council. You can't say like 'I'm buying this, so can you give me a rate'. You have to pay what they want, **so I'm not sure if, in terms of land, I can't see it, the costs would be probably be the same** for each car parking space, assuming that each land is worth the same as the next piece of land the same size.

Using exactly the same framing and same fragment

Results: Ravinder's approach to matching problems

2. A petrol station has noticed that other petrol stations in the local area have increased their price of a litre of petrol by 5 pence and are deciding whether or not to raise their price as well.

Results: Ravinder's approach to matching problems

Ravinder Number two, again, could have been profit maximisation, because they're competing with other petrol stations. You have the whole idea of, but I thought then again, it's market structures again, so petrol tends to be oligopoly or oligopolistic in nature so they won't compete to reduce prices to their lowest level, they will try and get a similar price and it's like tacit collusion and all that sort of problems and there's an issue of non-competition in there, so that one is different to that one in terms of competition.

Results: Ravinder's approach to matching problems

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Ravinder talks about two specific narratives he might use to define this problem – both taken from the discipline.

But his preferred narrative is 'market structure' (in contrast to Robert's 'break-even')

Results: Ravinder's approach to Problem 1 (pubs)

Ravinder If like you have lots of pubs closing down then obviously the areas where like the land obviously is now becoming more available, there's more like locations, so that will possibly decrease and this is the problem I had with this question. It was like, there were two ways I could go with it... Obviously if the land costs, if that were to decrease, obviously you would have costs overall decreasing and it's a fixed cost as well, so regardless of how much they're going to supply and demand, just because demand on land is going to decrease, then obviously the demand should bring down costs on land rent.

He was conscious of making a choice between two ways of framing the problem.

Ravinder's a
blem 1 (p

But still refers to market effects (for land) affecting costs (in a costs and revenue of the firm narrative)

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Ravinder's approach to Problem 1 (pubs)

Interviewer...Would you expect any effect on prices, particularly the price of beer that's sold in the town, as a result of this change?

Ravinder ...I think any increase in cost, like through the transport thing (a possible effect on increased cost of beer to the pubs he discussed earlier) will be offset by an increase in demand because there are less pubs available. There'd be less supply available so for the individual pub that's still available demand will increase for the pub. So, therefore you'd expect that their profits will increase, so therefore, they won't have to increase prices, but it would be interesting in that situation there were now too few pubs, so there was an over demand for these pubs and it couldn't fit everyone in. Then in that situation, obviously process would increase because there's too little supply to match the demand.

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An increase in costs
– increase price of
beer

Increase in demand
(which would
normally suggest an
increase in price)

So – 'offset'
looks a
problem

Ravinder's approach to Problem 2 (parking)

Ravinder Just on a simple supply and demand analysis, you would expect, if the demand remained the same, supply would therefore affect the price by reducing it...you expect the supply curve to shift and obviously reduce prices.

Ravinder's approach to Problem 2 (parking)

Ravinder Just on a simple supply and demand analysis, you would expect, if the demand remained the same, supply would therefore affect the price by reducing it...you expect the supply curve to shift and obviously reduce prices.

Chooses to see it as a market problem (not a market structure problem) – and not a single business problem like Robert

But assumes an increase in supply must be a shift in supply – i.e. just as with problem 1 his use of supply and demand is problematic

Ravinder's approach to Problem 2 (parking)

Ravinder You'd get economies of scale. If it was the same company it was the same like the last block they were just adding another block you'd obviously get economies of scale which means that like you would still probably use a certain amount of ticket machines and then you would have a certain amount of staff to look after the ticket machines, but the certain amount of staff looking after the ticket machines instead of one member of staff looking after two ticket machines you could have a member of staff looking after four...it would reduce costs.

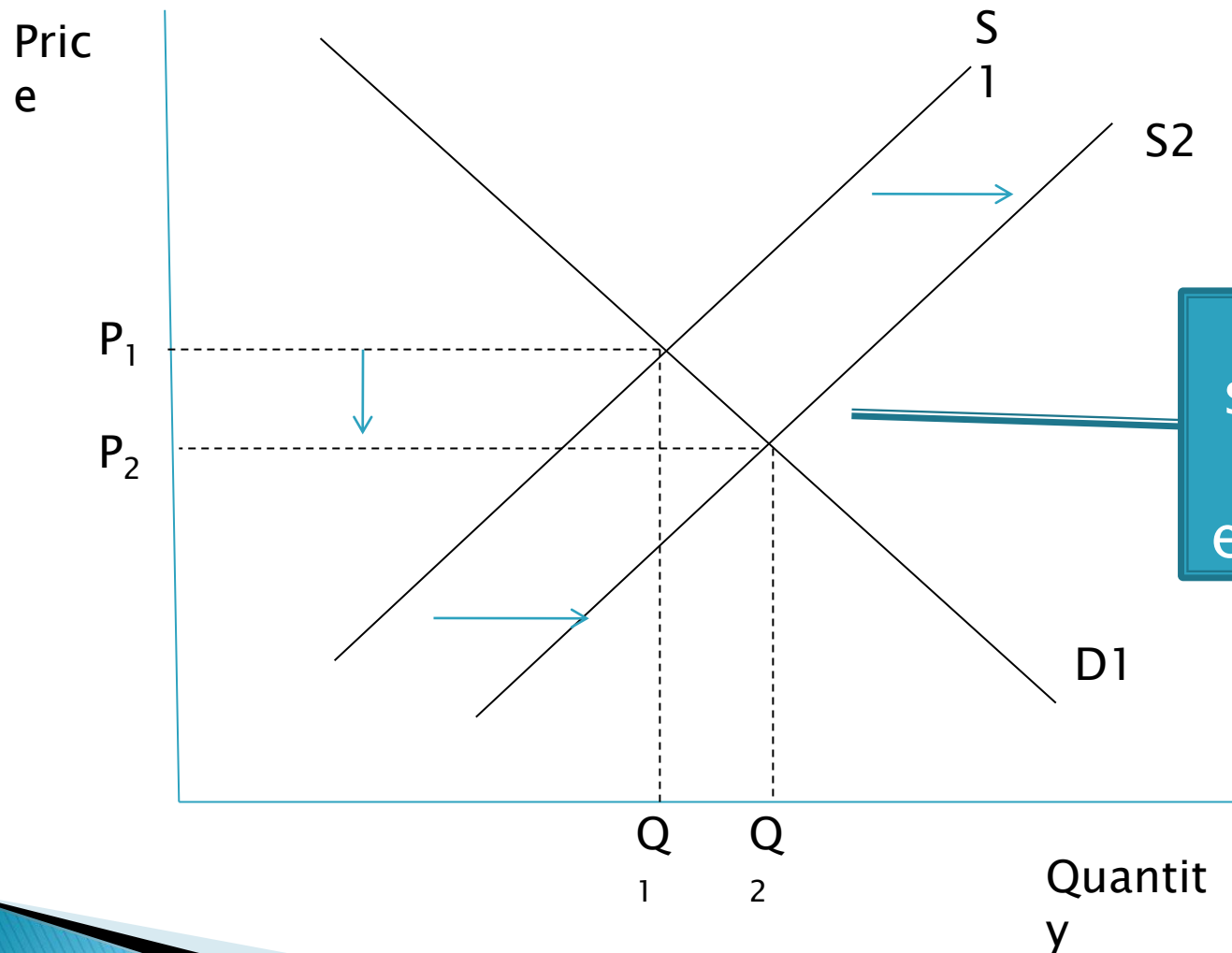
Ravinder's approach to Problem 2 (parking)

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He then appeals to another idea from economics to explain his expectations on costs. But he chooses a 'long run' idea without being explicit about the shift in timescale. He uses it rather like Robert's 'bulk buying'.

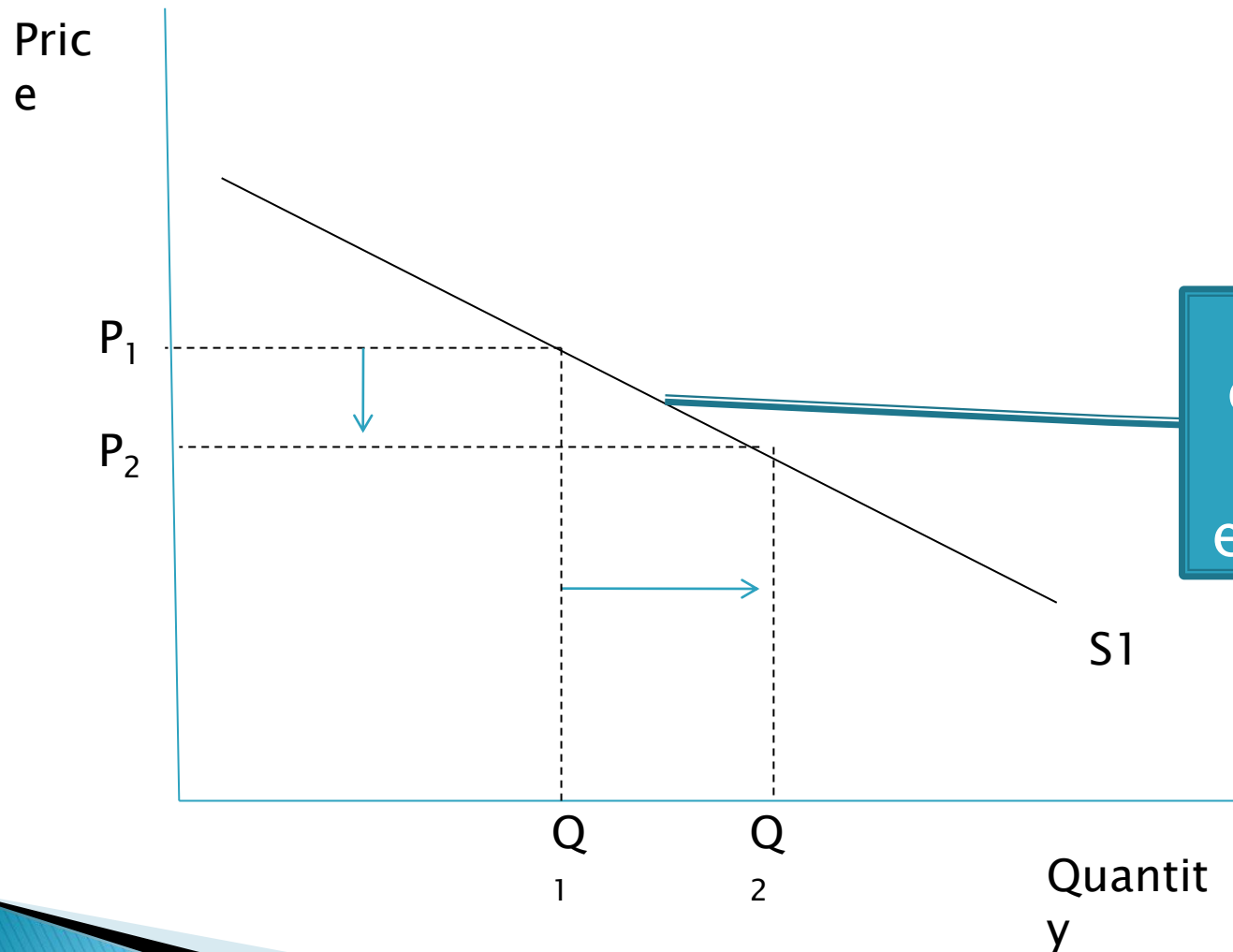
So using one idea (supply and demand) he suggests that price will rise and using another idea (economies of scale) he suggests price will fall.

Ravinder's approach to Problem 2 (parking)



Ravinder's
supply and
demand
explanation

Ravinder's approach to Problem 2 (parking)



Ravinder's approach to the matching problems task and tasks 1 and 2

1. He switches between explanations (e.g. supply and demand and economies of scale) – which are fragments of discipline narratives– like knowledge in pieces.
2. But his answers are also consistently framed by a willingness to look at the problems in terms of markets *and* individual business – including some use of a narrative (market structure) which explicitly relates the two. – like a framework

Alison's response to problem 1 (pubs)

Interviewer You talked about a change, I think a change in market structure. Why would there be a change in market structure?

Alison 'Cause there are fewer competitors and there's mentioned that there was some decreasing numbers of pubs and so the assumption that there are decreasing competitors, then the market structure changes and because each pub is now increasing its output and therefore there's a high possibility for economies of scale.

Interviewer You mentioned oligopoly and monopolistic competition. What would be the difference between it changing to oligopoly?

Alison If it's from monopolistic competition to changes to oligopoly then there are some bigger firms or bigger pubs emerges then they would perhaps, OK, because they then have more market power and they could charge higher prices.

Alison's response to problem 1 (pubs)

***Interviewer** You talked about a change, I think a change in market structure. Why would there be a change in market structure?*

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Use of a market structure narrative – more explicit than Ravinder

Like Ravinder also refers to ecs of scale – but more linked to market structure

Alison's response to problem 1 (pubs)

Interviewer OK You mentioned about rents, so how do rents relate to your mentioning about economies of scale?

Alison Just because the rent is somehow fixed for the pub, it pays a fixed amount of rent to their employer, it would also give them the place so if there are increasing customers and they can generate more revenue, generally then they would cover this fixed cost more efficiently.

Alison's response to problem 1 (pubs)

Interviewer OK You mentioned about rents, so how do rents relate to your mentioning about economies of scale?

Alison Just because the rent is somehow fixed for the pub, it pays a fixed amount of rent to their employer, it would also give them the place so if there are increasing customers and they can generate more revenue, generally then they would cover this fixed cost more efficiently.

Also like Ravinder there is no evident sense of distinguishing between a long and a short run

Alison's response to problem 1 (pubs)

Interviewer Is this what you meant by economies of scale or was it something else?

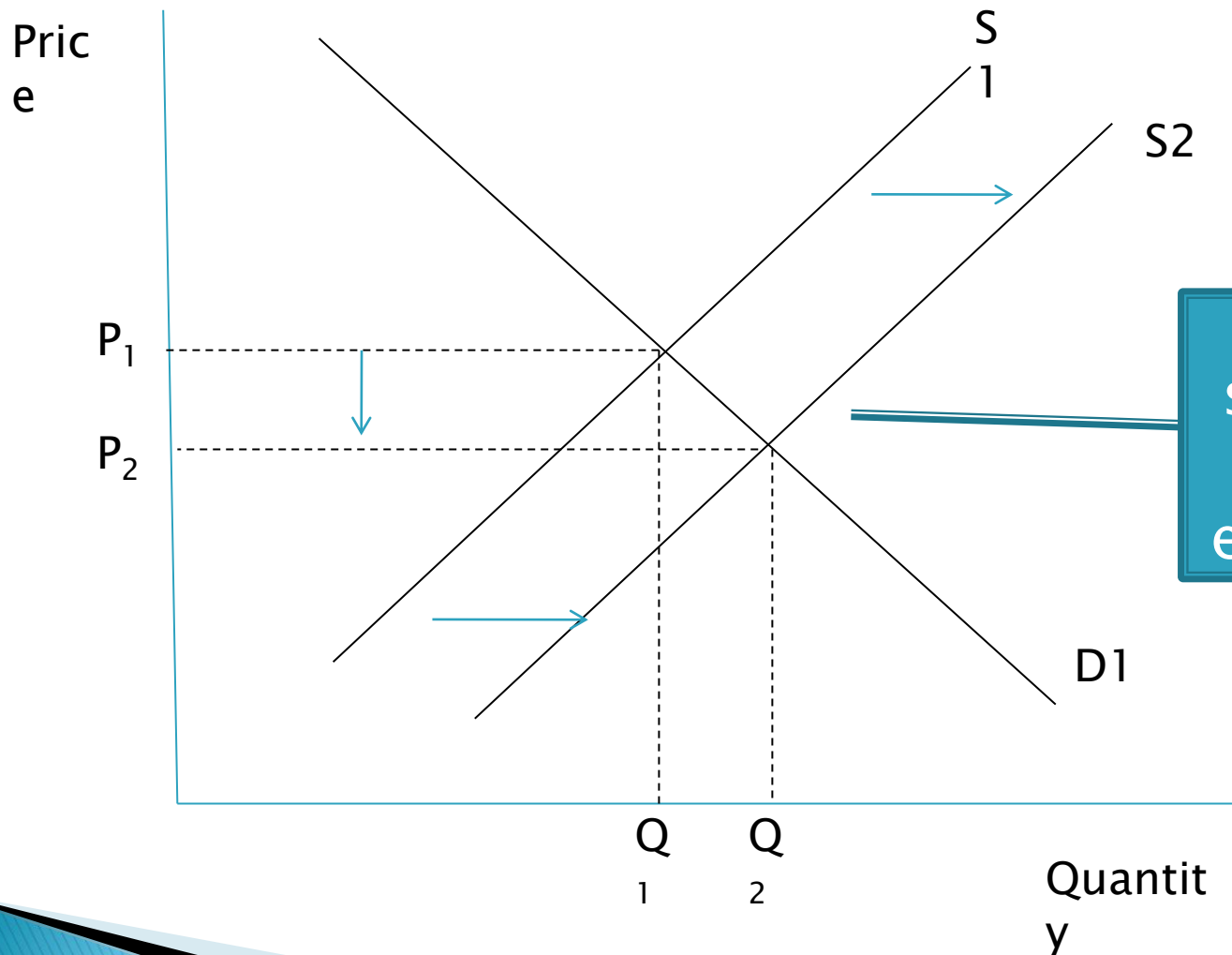
Alison Actually the definition of economies of scale is average production cost goes down as the output increases and the average cost comprises of fixed cost and the average variable cost. So in this case the variable costs are about, it's normally the salaries for the employees and the extra amount of beers and wines that they have to buy to sell and the fixed costs, I assume it would be the rent, yeah, so the average fixed costs is now going down as the output increases.

Interviewer So if the average fixed cost goes down that would always be showing there are economies of scale would it?

Alison Yeah

Confirmation of Alison's uncertainty about the short run/ long run distinction

Alison's diagram about car parks)



Alison's
supply and
demand
explanation

Alison's response to problem 2(car parks) defending the logic of her diagram

Interviewer So explain the shape of the supply curve you've drawn. Why would that be the appropriate shape to draw for this case of parking spaces?

Alison because when you are, for more parking space people buy, you have to get a larger piece of land and that piece of land will cost you a higher cost.

Interviewer Why would it cost more?

Alison because a larger piece of land definitely, because when the price of land is charged with a fixed, you know, area, yeah, and so if you wanted to produce a larger car park, you have to buy a larger unit of land and that would definitely cost you more.

Alison's response to problem 2(car parks) defending the logic of her diagram

Interviewer Would it cost you more per car parking space?

Alison It really depends. Normally, it should not, but in reality, if someone could take bigger land, so if you produce a very large scale car park, then it could be really expensive, 'cause these large lands can be used for some other productive projects, but for some scales, if this car park only four to eight cars then it could be of lower cost.

(...) Interviewer So let's take this scenario that you have to pay more for the land than you did, pro rata, wouldn't that put the cost of providing each car parking space up?

Alison Should do

Interviewer But your diagram shows it going down. So how does that work?

Alison's response to problem 3

Alison Because of the way I try to read through these questions, there's not much information about what the situation was and so I make it and I try and link it around to what it would be – the market structure or where it is normally the case – you know so there's not much information that I can make a lot of assumptions in order to explain

Explicit comment
about her
approach to
framing

Figure 1 Distinct Types of Conceptual Change (Davies and Mangan (2007))

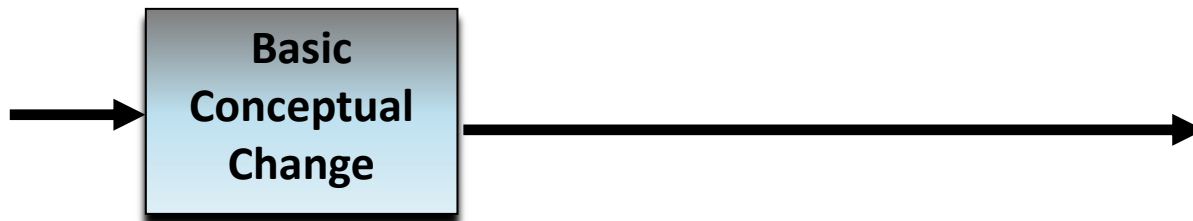


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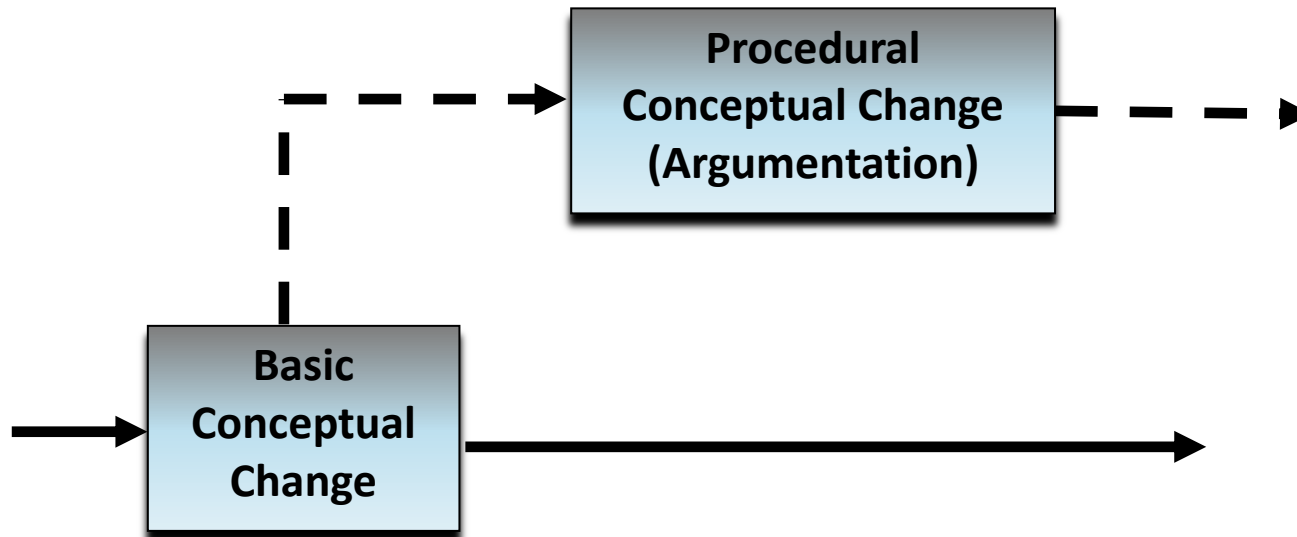
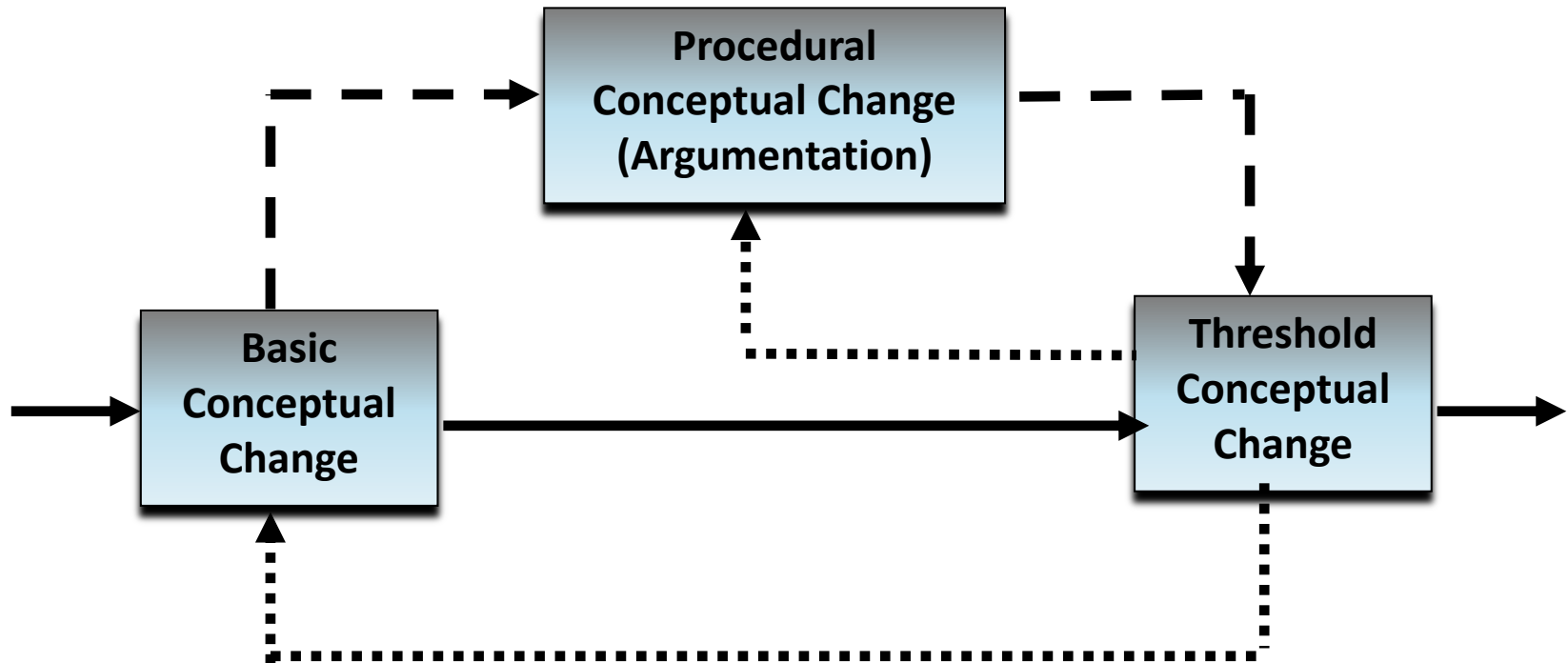


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Thankyou

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