Comment

The hypothesis that experienced cardiac surgical staff can accurately estimate systolic arterial blood pressure by digital palpation seems to be upheld in this study, although estimates of pulmonary artery pressure were less accurate. One potential criticism of the study is that junior staff may not perform at their best because of a concern not to embarrass their senior colleagues by outperforming them. In addition, it was not possible to totally eliminate the influence of observers copying each other's estimates, though the order in which estimates were made was varied to minimise this influence.

Visual assessment and digital palpation are often used by cardiac surgeons when extracorporeal circulation has been discontinued to assess systolic blood pressure and decide whether blood transfusion or inotropic support is needed. This is done out of habit and, not uncommonly, because the radial arterial catheter has accidentally been dislodged or obstructed.

By repeated palpation of major vessels and instant correlation with the monitoring display, surgeons may be able to train themselves. The skill of digital palpation may therefore become an integral part of surgical training.

It is, however, conceivable that cardiac surgeons may have genetically abnormally sensitive fingertips, perhaps related to an increased density of Meissner's corpuscles in the dermis. Current and future research is directed towards histological evaluation of the tips of cardiac surgeons' index fingers to assess the density of pressure receptors, although progress has been slow as experimental tissue has proved hard to obtain.

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Ability to distinguish whisky (uisge beatha) from brandy (cognac)

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Abstract

Objective—To assess ability to distinguish between first rate malt whisky and brandy and between different brands of each.

Design—Crossover with two sessions of 12 blind-fold tastings of two whiskies and two brandies before and after supper, repeated not more than seven days later.

Setting—Dundas, Ontario.

Participants—4 volunteers aged 50-68 years, all moderate drinkers of alcohol and members of a wine club.

Main outcome measures—Proportion of samples correctly identified (whisky v brandy) and, of those, the proportion of brands correctly identified.

Results—Only one participant produced irrefutable statistical evidence ($P < 0.0001$) of being able to distinguish between whisky and brandy, correctly identifying 50/51 (98%) samples. Two participants achieved some success in identification (72%, $P = 0.0031$ and 65% $P = 0.031$). The fourth participant's responses reflected pure guesswork. Brandy was no easier to identify than whisky ($P = 0.84$). The participant who was best able to distinguish between whisky and brandy was also best able to identify correctly the brand of whisky (100%, $P < 0.0001$).

Conclusion—Despite the fact that not all participants completed the full number of tastings the results show that some participants could distinguish neither between malt whisky and brandy nor between different brands of whisky and brandy. However, the success of one participant shows that "it can be done" and that his whisky specific ability is acquired not innate.

Introduction

In their classic study reported in the 1983 Christmas issue of the *BMJ* Chadwick and Dudley found that English surgeons cannot distinguish between single malt and blend whiskies.¹ We have addressed the more fundamental question: Can anyone identify whisky at all? We took advantage of a cunning experimental

design to ask also the subtle question: Can anyone distinguish between first rate whiskies and brandies?

Materials and methods

The four subjects were all volunteers, who gave oral consent to participate in the study provided that transport was provided. They were all mildly anglophobic and francophobic, being a Scot (participant 1), a Scots-Irish (participant 2), a New Zealander (participant 3) and a Canadian (participant 4). None was a surgeon. All were regular, if moderate, consumers of liquor and were members of a wine club, well versed in blind tasting. Critics may contend that exclusion of English and French (including Québécois) volunteers biased the results. Anglophiles and francophiles, however, are a small minority; the large majority of drinkers are anglophobes and francophobes.

The drinks selected for testing were the brandies Courvoisier and Rémy Martin and the whiskies Glenfiddich and Springbank. The brandies are probably the most widely available; the malt whiskies were chosen to balance the west of Scotland against the Highlands, but they are, of course, both *tobraichean na beatha*.² We should perhaps have chosen whisky from Islay, but this aberration probably did not affect the results.

The studies were conducted in the evening. The subjects were blindfolded. Each liquor was dispensed in a dose of 1 fl oz (8 drams, 28 ml) in a cut glass tumbler that would hold 6 fl oz (48 drams, 170 ml). The whole dose was rarely consumed. No water or other contaminant was permitted. To lessen the ethanol load each participant was studied in two sessions not more than seven days apart. At half time in each session, the participant consumed a light supper of soup, bread, and cheese washed down with a glass of Bulgarian Merlot.

DESIGN

We had intended to follow a multiple crossover format fully balanced by order with repeat observation before and after supper. The four varieties of liquor (two brandies, two malt whiskies) could have been

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arranged in 24 possible orders. Even with our enthusiastic team of participants the trial's steering committee considered two sittings each of 24 tastings to be impractical. We thus settled for a reduced design with two sessions of 12 tastings such that each "treatment" was assessed three times (in random order) before and after dinner.

Very little information was divulged to participants about the nature of the design other than that each administration of liquor would be one of the four brands. After each tasting, the participant was asked to indicate whether the treatment was brandy or malt, and in addition, which variety. An independent, entirely sober observer (DMEC) presented the samples in the appropriate order and recorded the responses.

ANALYSIS

Statistical analysis included individual tests of the null hypothesis that the respondent was effectively guessing the type of liquor. Under this hypothesis a 50% correct response rate would be expected; an exact P value can then be derived from the binomial distribution by calculating the probability of success for each tasting as 0.5. We quote one sided P values because we have a directional alternative hypothesis. The factors influencing correct response rate—namely, participant, liquor type, liquor brand,

whether the treatment took place before or after supper—were investigated with logistic function regression.

Results

Table I shows the characteristics of the four participants. Table II shows the ability of the participants to determine accurately whether a drink was brandy or malt; the findings represent the proportion of correct responses—for example, identifying "brandy" when either of the brandies was presented—achieved by each participant over the multiple presentations of each of the four liquors. Table II also shows separately each participant's performance before and after dinner.

The P values associated with the null hypothesis of "purely guessing" indicate that only participant 1 produced irrefutable statistical evidence ($P < 0.0001$) of being able to tell brandy from malt whisky; of the 51 samples he tasted, he correctly identified the type of liquor on 50 (98%) occasions. Compared with participant 1, the other participants were "also rans" although participants 4 and 3 achieved some success (72%, $P = 0.0031$ and 65%, $P = 0.031$ respectively). Participant 2's responses were entirely consistent with pure guesswork.

A logistic function regression model including the influencing factors of participant, liquor type, liquor brand, and whether the tastings took place before or after supper supports the visual impression conveyed by the findings in Table II. Clear differences existed between participants' ability to distinguish brandy from malt whisky ($P < 0.0001$); a modest non-significant decline occurred in the success rate after supper ($P = 0.27$); little evidence existed of brandy being any easier to identify than malt whisky ($P = 0.84$); the rates of correct responses were quite consistent between the two types of brandy and between the two malts.

Table III shows participants' ability to make subtler distinctions—namely, to identify the correct brand of liquor once the correct type had been identified. Unsurprisingly, the three participants who were least able to determine liquor type fared poorly at choosing the right brand; they were lucky enough to get the type right. Our star taster obviously knew his malt whiskies because he was able to assign brands correctly in all 25 malt tastings ($P < 0.0001$). His brandy palate was less well developed as he correctly identified brandy in only 16/25 (64%, $P = 0.11$) of samples.

Discussion

The design was not implemented quite as planned; hence, slight discrepancies exist in the number of tastings, but these do not invalidate the findings.

The small number of participants prevents us from broad generalisation, but the results show that some participants not only could not distinguish between brands of whisky and brandy but could not distinguish whisky from brandy. If we had chosen different brands our findings might have been different. This possibility seems unlikely, but if we had further resources we would be prepared to examine it.

We were lucky to have participant 1 (who did not know he was a connoisseur) in the study because his remarkable performance on the malt whiskies has several far reaching implications. Firstly, he shows that "it can be done." Secondly, his results effectively confirm the absence of defects in the design or conduct of the experiments or in the aberration of the subjects' judgment as factors affecting these data. Thirdly, the finding that his performance with the brandies was only human argues that his talent is whisky specific. Finally, this whisky specificity argues for an acquired skill rather than an innate one.

TABLE I—Characteristics of participants in tastings of malt whisky and brandy

Participant	Age (years)	Weight (kg)	Age began drinking alcohol	Average consumption during past 10 years (l/year)	
				Brandy	Malt whisky
1	50	100	16	<1	20
2	68	85	20	3	10
3	59	90	35	<1	12
4	61	95	35	<1	12

TABLE II—Proportion of samples correctly identified—brandy v malt whisky

Participant	Type of liquor	Correct identifications		Total (/)	P value
		Before supper	After supper		
1	Brandy 1	7/7	7/7	14/14 (100)	<0.0001
	Brandy 2	6/6	5/5	11/11 (100)	
	All samples of brandy	13/13	12/12	25/25 (100)	
	Malt whisky 1	7/7	6/6	13/13 (100)	
	Malt whisky 2	6/7	6/6	12/13 (92)	<0.0001
	All samples of malt whisky	13/14	12/12	25/26 (96)	
	All samples	26/27	24/24	50/51 (98)	
2	Brandy 1	4/6	3/6	7/12 (58)	0.50
	Brandy 2	1/5	3/4	4/9 (44)	
	All samples of brandy	5/11	6/10	11/21 (52)	
	Malt whisky 1	4/8	5/8	9/16 (56)	
	Malt whisky 2	4/6	1/5	5/11 (45)	0.50
	All samples of malt whisky	8/14	6/13	14/27 (52)	
	All samples	13/25	12/23	25/48 (52)	
3	Brandy 1	4/6	3/5	7/11 (64)	0.095
	Brandy 2	5/5	2/5	7/10 (70)	
	All samples of brandy	9/11	5/10	14/21 (67)	
	Malt whisky 1	5/6	3/6	8/12 (67)	
	Malt whisky 2	4/8	5/7	9/15 (60)	0.13
	All samples of malt whisky	9/14	8/13	17/27 (63)	
	All samples	18/25	13/23	31/48 (65)	
4	Brandy 1	5/6	4/7	9/13 (69)	0.039
	Brandy 2	5/7	4/6	9/13 (69)	
	All samples of brandy	10/13	8/13	18/26 (69)	
	Malt whisky 1	5/6	3/6	8/12 (67)	
	Malt whisky 2	4/5	4/5	8/10 (80)	0.026
	All samples of malt whisky	9/11	7/11	16/22 (72)	
	All samples	19/24	15/24	34/48 (71)	

TABLE III—Correctly identified brands as proportion of correctly identified type of liquor

Participant	Brandy 1	Brandy 2	Total (/) brandy	Malt whisky 1	Malt whisky 2	Total (%) malt whisky
1	8/14	8/11	16/25 (64)	13/13	12/12	25/25 (100)
2	3/7	1/4	4/11 (36)	5/9	3/5	8/14 (57)
3	4/7	2/7	6/14 (43)	6/8	7/9	13/17 (76)
4	4/9	2/9	6/18 (33)	2/8	0/8	2/16 (13)

We hasten to dissociate ourselves from any suggestion that participant 1's "maltability" is discontinuous with that found in a "normal" population. Intuitively we would side with Pickering rather than Platt, if you get our meaning. Is the ability to acquire skill of the order demonstrated by participant 1 congenital? Or, to put it more bluntly, is the characteristic of being trainable innate? The answer to this question requires more time than we can expect to have, but despite the gaping holes in the present state of our fundamental understanding we can pragmatically and confidently give the following advice.

- (1) Start young and practise diligently.
- (2) Assess your maltability (or for that matter, your

"brandyability") with our technique about once a year.

(3) Should your palate prove to be trainable, acquire a decanter for your guests.

Nollaig Chridheil agus bliadhna mhath ùr (dhuibh uile)!

We thank the duty free shops at Gatwick, Heathrow, and Toronto airports for making the study possible; Professor Watson Buchanan for the Gaelic; and above all our subjects for their sustained and cheerful cooperation.

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2 Daiches, D. *Scotch whisky: its past and present*. London: Andrew Deutsch, 1969.

Commentary: A spirited attempt

Ken MacRae

Scotch malt whisky has been the subject of another study from Canada earlier this year. Lapointe and Legendre from the University of Montreal used cluster analysis to group the 109 distilleries in Scotland that produce single malt whiskies.¹ Ambitious as that study was, it did not do full justice to the topic as many of these distilleries bottle at several ages and strengths. Jackson estimates that over 400 different bottlings of Scotch malt whisky exist at any time.² Cognac is also available from many producers and in different grades—for example, three star, five star, VSOP, XO, Napoleon, and vintage. So this paper, by Campbell *et al*, in considering just two malt whiskies and two cognacs, hardly constitutes even a pilot study of this subject.

CHOICE OF TEST DRINKS

The malt whiskies chosen for the study were Gleniddich and Springbank. Gleniddich, from Dufftown, is the world's best selling single malt, at least as great a tribute to its marketing as its taste. It is a light and dry whisky and is often said to be an ideal introduction to single malt whisky. Springbank, from Campbeltown, is altogether a different proposition. Jackson notes that it has been described as „Premier Grand Cru Classé and that most admirers of single malt whiskies would include it among their handful of favourites.² Unfortunately, Campbell and his colleagues do not tell us the age at which their test Springbank was bottled. A serious limitation in the test procedure used in this study was the forbidding of the addition of even a small amount of water. Addition of water is considered by connoisseurs of single malt whiskies to be essential, with the few drops added often being referred to as the „dew on the rose.² It is almost beyond belief that the authors consider that their non-inclusion of an Islay malt whisky probably did not affect their results. Have they never sampled Ardbeg or Laphroaig?

The cognacs selected were Remy Martin and Courvoisier. Remy Martin's popularity is a great tribute to its marketing. Its light and dry flavour makes it an approximate cognac equivalent to Gleniddich. Courvoisier, of course, bottles several grades of cognac, but Campbell and his colleagues do not tell us which grade was tested. The choice of Bulgarian Merlot as the wine for the half time meal was made presumably on grounds of economy, given the expensive nature of the test drinks.

DESIGN POORLY IMPLEMENTED

Although the study was designed to have two sessions of 12 tastings—one before and one after dinner—on two separate days, and an independent, entirely sober observer, was to be responsible for presenting the test drinks and recording the responses, table II shows that the intended number of tastings was hardly ever achieved. The failure to implement the study design fully is alluded to, but not explained, in the discussion. Might this failure be evidence of „secondary drinking,² the fumes from all the glasses of whisky and brandy impairing the performance of the independent, entirely sober observer?

REPRESENTATIVE SUBJECTS?

Turning now to the study's subjects, it was surprising to see the comment that most drinkers are anglophobes and francophobes. Perhaps this view is specific to Canada? Lapointe and Legendre, the authors of the previous study, have suspiciously French sounding names,¹ and the references in their paper show that Lapointe has written at least one paper in French. It is difficult to think of the population represented by the sample who took part in Campbell *et al*'s study—even though the four ethnic origins of the participants were all available in Ontario, Canada. One of them, participant 1, is in a class of his own as regards performance in the tastings in this study. The description of the volunteers shows participant 1 to be a Scot.

NO SURPRISE

Therefore, despite the study being carried out in Canada, with an arguably less than ideal choice of test whiskies and cognacs, and with some evidence of unintended errors in the implementation of the study plan, the results are entirely as expected: the Scot was vastly superior to the others. If he reads this he might be entertained by a short piece of verse that emanates from the Speyside region of Scotland:

The Lord is my shepherd, I shall not want,
As long as there's whisky in Glen Grant.
And when it's all done, no more to pour,
We'll up the line to Cragganmore.

1 Lapointe F-J, Legendre P. A classification of pure malt Scotch whiskies. *Applied Statistics* 1994;43:237-57.

2 Jackson M. *The world guide to whisky*. London: Dorling Kindersley, 1987.