

THE CURIOUS CASE OF LUTHER TRANT AND WEBER'S LAW

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Abstract

Edwin Balmer (1883-1959) and William Briggs MacHarg (1872-1951) co-authored some detective stories called 'The Achievements of Luther Trant' (1910). Luther Trant was a fictional detective, who used psychological techniques. The story of 'The Empty Cartridges' hinges on the size of the Weber fraction for weight discrimination, which would need to be 1/15. The authors described the method of measurement, and concluded that only one suspect possessed the necessary discrimination. One of the authors must have studied psychophysics. Balmer studied at Northwestern University, gaining an A.B. in 1902, followed by an A.M. from Harvard University in 1903; but the subject of his studies is unknown. MacHarg attended the University of Michigan from 1892-95. However, his solo collection of stories 'The Affairs of O'Malley' (1940) contains only popular psychology with little scientific detail. This makes it likely that Balmer provided the technical psychological detail. The shortage of biographical detail leaves this a mystery.

Edwin Balmer (1883-1959) and William Briggs MacHarg (1872-1951) co-authored several books including *The Achievements of Luther Trant* (1910), a series of detective stories. Luther Trant was a fictional detective, who used psychological techniques in his investigations. Some of the stories show detailed knowledge of psychophysics, so at least one of the authors must have studied experimental psychology at university. We attempted to track down which it was. The evidence comes partly from internal details within the stories, and partly from biographical material provided by others.

Clues from the Stories

Story VII in *The Achievements of Luther Trant* was *The Empty Cartridges* – probably the first psychophysical detective story. The body of Neal Sheppard has been found shot dead in a shack in some woods north of Chicago, and Jim Tyler Jnr is the chief suspect. Stephen Sheppard, Neal's brother, calls in the forensic psychologist Luther Trant to assess the evidence. Trant questions the men who discovered the body, who hand over the various cartridges and bullets they had found, and describe the odd locations of bullet marks in the shack. Trant thinks that Neal and his murderer had been fighting a duel in the dark, thus mostly missing each other, with five potential shots each. He inspects the cartridges and finds that half of them have no powder, and are slightly lighter (300 instead of 320 grains). He suspects that Neal had rigged it so that he himself had good cartridges and his rival dud ones. However, the rival must have knocked all the cartridges to the ground, and they then each picked up five. The rival would have been able to tell the difference in weight between the good and dud cartridges, and thus managed to pick four good and one dud one, whereas Neal got the reverse. The rival could then succeed in shooting Neal. Trant knows his Weber's law,

and realises that the murderer must have weight discrimination as good as $20/300$ or $1/15$ (0.067). Trant claims to have trained himself in the psychological laboratory to a value of $1/40$ (0.025), but knows that most untrained people have discrimination poorer than $1/15$. He then sets up a test to eliminate Tyler and another suspect (Figure 1). He takes five steins (beer tankards with lids) and puts varying amounts of lead shot in them (to weigh 100, 105, 107, 108, and 110 drams) and arranges them in a random order. He asks the suspects to compare the other tankards with the middle tankard (6 ounces or 100 drams), and say whether they feel heavier, lighter or the same. He repeats the test with two more random orders. The suspects perform randomly, except for the 110 dram stein. They thus show discrimination of $1/10$, which is not fine enough for the good and dud cartridges. Trant then wants to test another suspect, Enoch Findlay, a reclusive numismatist. He borrows some Swiss silver florins from a curio shop, and calls on Findlay and asks him to advise him on whether they are genuine. Findlay compares them with a genuine coin of his own, and decides that one coin is genuine (weighing about 400 grains or one ounce) and the rest are counterfeit, being too light (by 20 grains). Trant concludes that Findlay could discriminate $1/20$, and thus could have been the assailant. Findlay then confesses and explains the details of the duel, and the reason for it. It is revealed that Neal had done bad things and deserved his death, so the others agree to let the matter rest and report it as a hunting accident in the woods. Psychophysics saves the day.



Figure 1. Trant's weight discrimination test. (Balmer & MacHarg, 1910)

Trant's Psychophysics

Luther Trant has such detailed knowledge of psychophysics that he probably studied experimental psychology at university. Trant is described (around 1909) as a 'young man' (perhaps under 30 years old), so he probably attended college between about 1898 and 1903. Balmer was 26 in 1909 and MacHarg 37, making Balmer the more likely candidate for Trant's model. The measurement of weight discrimination was a common topic in practical classes (e.g. Sanford, 1898). Several psychology textbooks were available in English, some giving details of the Weber fraction for lifted weights. One example is Julius Bernstein *The Five Senses of Man* (1876). In chapter 3 he states that Weber found that 19.5 ounces could be distinguished from 20 ounces, giving a ratio of 1/40 (0.025). Bernstein also mentioned Weber's discovery that cold coins feel heavier than warm coins when placed on the skin. The most influential text was probably William James *The Principles of Psychology* (1890). James reports that Weber found a fraction of 1/40 (0.025) when two weights were lifted successively by the same hand; that Hering found a fraction of 1/21 (0.048) for 250 gram standards, 1/114 (0.009) for 2500 grams, and 1/98 (0.010) for 2750 grams; and Merkel about 1/15 (0.067) for standards between 200 and 2000 grams. Ladd (1894, pp. 367-9) cites Weber's value of 1/40, and mentions that others found varying results. Scripture (1897, p.267) cites Weber as finding a fraction of 3/32 (0.094) for four persons. The most detailed information is given in Titchener (1905) – rather too late for Trant's time at college. He quotes Weber as saying in the *De Tactu* (1834) that practised observers could discriminate 1/30 (0.033), and less practised observers 1/15 (0.067). Titchener pointed out that Weber gave different values in different publications, and seems to have been confused about his own data.

Weber stated in the *De Tactu* (1834; Ross & Murray, 1996, p.117) that practised observers could distinguish 1/30 (0.033), and unpractised 3/32 (0.094). But in *Der Tastsinn* (1846; Ross & Murray, 1996, p.199) he states that observers can distinguish 1/40 (0.025) "without previous lengthy practice". This is indeed confusing. More recent experiments with unpractised observers tend to give values around 0.12 for weights of 50 g, and 0.09 for weights of 200 g and 400 g (Ross & Brodie, 1987). However, there is probably enough in the earlier texts for Trant to have learned that a practised observer can discriminate 1/40 (0.025), and unpractised observers about 1/15 (0.067) or 1/10 (0.10). In Trant's experiment, the suspects were dealing with tankards weighing about 180 g. The coins, however, weighed only about one ounce or 30 g, and the Weber fraction rises for light weights. Trant does not seem to have been aware of this latter fact, and assumed that a test at 180 g would be valid for 30 g.

Trant could have acquired knowledge of the Weber fraction from various texts, but where did he get the idea of the Swiss coins? Weber used coins in some of his weight experiments. He wrote in *De Tactu* (p. 69 in Ross & Murray, 1996): "The constant weight was composed of six silver coins, all of the same size and weight. I arranged six Joachims (a type of coin) in one column. Ten Joachims contain one pound of silver and almost a sixth of a pound of copper. The variable weight consisted of six, five, four, three or two Joachims. The variable weight was reduced until the difference was discriminated by touch. The constant weight was almost equal to twelve ounces, all Joachims weighing just under two ounces." A Joachim, or Joachimsthaler, was a silver coin first minted in Joachimsthal. The name of the coin was shortened to *taler* or *thaler*. Early talers weighed about one ounce, or half the weight of Weber's alloyed coins, but similar to Trant's "Swiss florin". Curiously, Weber's alloyed coins were heavy, whereas Trant's alloyed coins were light. Perhaps Trant was able to read Weber's works in Latin or German. At that time American psychology students were often required to learn German, and to read German works in the original text. Indeed, in *The Eleventh Hour* Trant tells us that "the experimental investigations of Freud and Jung, of the

German and French scientists, of Munsterberg and others in America - had fired him with belief in them and in himself.” (p.325).

Trant’s psychological techniques come into play again in the story of *The Man in the Room*. We learn that Trant was a student of psychology and later a laboratory assistant (p.3), perhaps at Harvard University (p.23). He uses a chronoscope to measure a suspect’s reaction time to various incriminating words. “The instrument he decided to use was the pendulum chronoscope, as adapted by Professor Fitz of Harvard University.” (p.23). This chronoscope was available in other psychological laboratories, such as at the University of Wisconsin (Jastrow, 1893), so Trant was not necessarily a Harvard student.

Other Sources

Published Sources

There is a biography of Balmer (but not MacHarg) in *Twentieth-Century Crime and Mystery Writers* (1980), written by Katherine Staples. Her summary runs: “BALMER, Edwin. Collaborated with William MacHarg. American. Born in Chicago, Illinois, 26 July 1883. Educated at Northwestern University, Evanston, Illinois. A.B. 1902 (Phi Beta Kappa); Harvard University, Cambridge, Massachusetts, A.M. 1903. Married 1) Katharine MacHarg in 1909 (died, 1925); two daughters and one son; 2) Grace A. Kee in 1927. Reporter, Chicago *Tribune*, 1903; associated with Graham Taylor in publishing *The Commons*, New York, 1904-05; Editor, 1927-49, and Associate Publisher, 1949-53, *Red Book* magazine. *Died 21 March 1959.*” Staples also lists Balmer’s many solo and joint novels on crime and other matters. An entry in *Who was Who in America* (Vol. III, 1960) for MacHarg reads: “MacHarg, William (Briggs), author; b. Dover Plains, N.Y. Sept 18, 1872....student U. Mich., 1892-95. Reporter, ass’t Sunday editor and Sunday editor, Chgo. Tribune, 1899. Author (with Edwin Balmer) [of several books 1910-1921]; author of *The Affairs of O’Malley* (1940). Contr. to *Sat. Eve. Post*, *Colliers*, and other magazines....Died Feb. 21, 1951.” According to Staples, their best remembered detective stories were *The Achievements of Luther Trant*. In these stories psychology is introduced as a means of detection, with word association tests, memory tests, and lie detectors. She does not mention psychophysics.

Leonard Krasner (1983) wrote on *The Psychology of Mystery*, and discussed the influence of experimental psychology and the use of laboratory equipment such as the chronoscope, citing Münsterberg (1908). He noted the Luther Trant stories as the first to use a lie detector, and the first to feature psychological science as the main factor in the detection of crime. Again, there is no specific mention of the first use of psychophysics.

Mary DeJong Obuchowski, in *The Indian Drum and its authors: A reconsideration* (1995), gives little information about the authors, despite her title. She describes *The Achievements of Luther Trant* as “a group of short mysteries set in Chicago all solved by psychological means which were rather new at the time. Trant, the detective, is extraordinarily singleminded and rather unpleasant, but very effective.”

Michael Grost (2008) in his website on *Scientific Detectives* includes a section on *MacHarg and Balmer: Into the Mind*. He discusses the Luther Trant stories and writes: “Trant is a psychologist, Chicago based, who works as a criminological consultant on mysteries. He is a young, clean cut and dynamic scientist.” Grost likes the story *The Man Higher Up*, but does not have much enthusiasm for the other Trant stories, and does not mention *The Empty Cartridges*. He goes on to discuss MacHarg’s solo collection *The Affairs of O’Malley* (1940), and says it “is written in a different style, one that only rarely evokes anything scientific.” The emphasis in the Trant tales was to use technical psychological methods to reveal the killer’s mental secrets, whereas in the O’Malley tales the emphasis was on triggering a confession.

Searching for Details

The above analysis makes it likely that it was Balmer rather than MacHarg who contributed the details of technical psychology. We have tried to find obituaries for these authors, without success. Balmer died on 21st March 1959 in North Tarrytown, New York – now known as Sleepy Hollow. A request for information brought this reply from Kristin Welltzheimer of the Warner Library: “We did find the obit in the Tarrytown Daily News, but unfortunately the microfilm was so blurred and faint that it is unreadable.” MacHarg was born in Dover Plains on 18th September 1872 and died on 21st February 1951. A request to the Dover Plains library brought no response.

Some summaries of books by Balmer describe him as ‘an engineer’ (e.g. Wylie & Balmer, *When Worlds Collide*, 1933, reprinted 1999). It is unclear where this information comes from. It may be a supposition based on the technical detail in some of his stories, or perhaps he studied what is now known as ‘engineering psychology’ or ‘ergonomics’.

We tried to obtain information about Balmer’s degree at Harvard from Celia Raia of the Psychology Department. She replied: “Your project sounds fascinating! I’ve written to the Alumni Records Office about Edwin Balmer and will let you know what they say. I don’t believe we’d be able to find out what courses he took. I suspect the degree may have been awarded by the Dept. of Philosophy, based on the following excerpt from a short history of Psychology at Harvard”:

The study of psychology, as something other than a branch of philosophy (albeit still under the wing of the Philosophy Department), began at Harvard in the late 1800’s. The “new” psychology was pioneered by William James, who offered his first formal course in physiological psychology in 1875-76, the same year in which he established a laboratory devoted to that subject. The first doctoral degree including “psychology” in its title (i.e. philosophy and psychology), was awarded to G. Stanley Hall in 1878. By 1892, Hugo Munsterberg had been appointed professor of experimental psychology and director of the psychological laboratory. The discipline remained linked to Philosophy throughout the early years of the century, during which its range expanded, as indicated by the formation in 1927 of the Psychological Clinic, under the direction of Morton Prince. (He was succeeded by Henry A. Murray in 1928.) The vigorous leadership of E.G. Boring brought status as a separate department in 1934, though Psychology remained linked to Philosophy through a divisional structure until 1936 when it finally was allowed to stand alone.

This remains the current state of our enquiries. We can only guess that Balmer was the psychologist.

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Coimriu - Rinne Edwin Balmer (1883-1959) agus William Briggs MacHarg (1872-1951) comheagrú ar roinnt scéalta bleachtaireachta faoin teidil 'The Achievements of Luther Trant' (1910). Bleachtaire ficseanúil, a d'úsáid teicnicí síceolaíochta ab ea Luther Trant. Tá an scéal 'The Empty Cartridges' ag brath ar mhéid codán Weber maidir le idirdhealú meáchain. Níor mhór do bheith 1/15. Ta cur síos ag na húdair ar mhodh a tomhaiste agus tháinig said ar an tuairim nach raibh an cumas idirdhealaithe cuí ach ag duine amháin díobh sin a bhí faoi amhras. Caithfidh sé go raibh cur amach ag duine de na húdair ar shícfisic. Bhí Balmer ina mhac léinn ag Northwestern University áit ar bhain sé amach A.B. i 1902. Fuair sé A.M. ó Ollscoil Harvard i 1903 ach ní fios cén ábhar staidéir a bhí aige. D'fhreastail MacHarg ar Ollscoil Michigan ó 1892-95. Ach is popshíceolaíocht ar bheagán sonraí eolaíochta atá i 'The Affairs of O'Malley' (1940), an cnúsacht scéalta a d'fhoilsigh sé féin. Fágáan sin gur dócha gurb é Balmer a sholathraigh na sonraí teicniúla síceolaíochta. D'uireasa mionsonraí beatháisneiseacha, nil teacht ar fhreagra na ceiste.

Geàrr-chùnnntas - Sgrìobh Edwin Balmer (1883-1959) agus William Briggs MacHarg (1872-1951) sgeulachdan lorg-phoileis ris an canar 'The Achievements of Luther Trant' (1910). Bha Luther Trant na lorg-phoileas, agus chuireadh e eòlas-inntinn gu feum. Tha an sgeulachd 'The Empty Cartridges' an crochadh air meud bloigheag Weber airson dealachadh a dhèanamh eadar cudroim. Shoilleirich na h-ùghdaran dòigh an tomhais, agus cho-dhùin iad gun robh aon neach bho amharas a-mhain leis an robh eadar-dhealachadh cho math ri 1/15. Is docha gun robh aon de na h-ùghdaran air psychofiosaig ionnsachadh anns a' cholaiste. Fhritheil Balmer oilthighean Northwestern is Harvard, agus chaidh MacHarg gu oilthigh Michigan, ach chan eil fios ann dè na cuspairean a ghabh iad. Chan eil mòran eòlais-inntinn teignigeach anns na sgeulachdan a rinn MacHarg leis fhèin, agus air sgàth sin tha e coltach gum b' e Balmer a thug seachad na mion-phuingean teignigeach. 'S e diomhaireachd a th' ann, mar thoradh air gainnead de dh' fhiosrachadh beatha-eachdraidheil.