

THE

**JASTROW**

**ILLUSION**

IN

**MAGIC**

A Treatise on the Venerable  
Boomerang Trick

P E T E R P R E V O S

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Sample

# Chapter 1

## Introduction

One of the first tricks I performed as a young boy was the venerable boomerang illusion. This magic trick involves two identical boomerang-shaped pieces, but when the magician places them next to each, one of them seems to be smaller than the other. I have always been fascinated by the strength of this illusion because it persists even when you know that the two shapes are in reality the same size.

The boomerang trick seems to be a simple optical illusion that is only useful to entertain children. A recent Twitter post by BBC journalist Mark Blank-Settle shows that this illusion can still capture the imagination of adults. His video went viral, and news outlets around the world brought attention to his magical illusion.<sup>1</sup> Magicians often use optical illusions as a device to create the experience of magic and have used the Jastrow illusion, as the boomerang illusion is known in to psychologists, to perform magic since the early twentieth century. A plethora of renditions of this magic trick has been marketed and published over the past century. Magicians are not alone in their fascination with this optical illusion. It is also of interest to psychologists. The Jastrow illusion is one of the earliest optical illusions researched in the laboratory. It has been used to investigate the development of perception in children and to test the extent of brain damage in stroke patients.

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<sup>1</sup>@MarcSettle, [twitter.com/MarcSettle/status/717812888740761600](https://twitter.com/MarcSettle/status/717812888740761600), 7 April 2016.

This booklet summarises the scientific background of the illusion, drawing from more than a century of scholarly publications on this geometric curiosity. The second part provides a systematic overview of how magicians use this principle to create the illusion of magic. The psychological research adds context for magicians with an interest in the science of their craft, but it also gives the performer useful information for a script. The history of the boomerang illusion has produced a wide range of techniques and presentations that adds layers of deception to this trick. This booklet contains a wealth of information and suggestions to inspire the reader to develop interpretations of this plot for their own performances.



*Commercially available boomerang illusion props.*

## Chapter 2

# The Jastrow illusion in Science

Psychologists have extensively studied optical illusions to understand how our mind deceives itself since the middle of the nineteenth century. Studying these illusions helps them to understand how the mind observes the world and interprets information. Knowledge about how the mind is deceived has practical implications. For example, the control rooms of factories contain instruments to help operators make correct decisions. Engineers design these instruments so that there can be no misunderstanding on how to interpret the information they present. Another application can be found in traffic engineering because roads need to be designed so that visual information is correctly interpreted by the driver to reduce the chance of accidents.

Optical illusions are sometimes deliberately introduced to prevent errors of perception. Ancient Greek architects shaped stone columns in a gentle curve with their base slightly wider than the top so that they appear perfectly straight. Optical refinements to feign geometric perfection is common to Doric Greek temple architecture. A prime example is the Parthenon on the Acropolis of Athens, an ancient building that is admired for its architectural perfection. To achieve this perfect geometry, the architects Ictinus and Callicrates curved almost every line in the design, creating the illusion of straight lines and geometric perfection.

Illusions occur when the mind forms a view about reality which, after further examination, appears to be incorrect. When a magician performs a show,

her actions are designed to create the illusion that magic has occurred. The performer leads us to believe that a coin has vanished, while it was hidden in her hand. A magic show has two realities: the one perceived by the spectators and the hidden reality controlled by the magician.

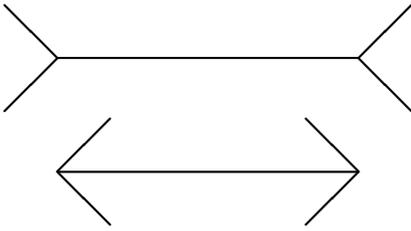
Illusions are not only created in the hands of magicians, they also exist outside the proscenium of the magic show. When you sit in a stationary train, and the adjacent one starts moving, it feels as if you are travelling yourself. After your train has departed and you look through the back window, it seems as if the tracks meet in the distance, even though you know for certain that they are perfectly parallel. This train journey illustrates two real-life examples of optical illusions.

There are two ways the mind can be confused by optical illusions: visual and cognitive illusions. A visual illusion occurs when we are deceived because of the physical circumstances. They are caused by distortions of the light entering our eyes, such as the mirrors in an amusement park. When you look into a curved mirror, you will appear shorter, longer, fatter or thinner than you are. Optical illusions are also the foundation of the art of photography. Photographers combine focal length, aperture and exposure time to create an artful photograph. Their work is never a perfect replica of reality but an interpretation of reality by the photographer.

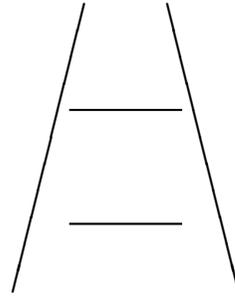
While visual illusions have a physical cause, cognitive illusions are created inside the mind. The way our mind interprets the visual stimuli delivered to the brain through the optical nerve is the cause of cognitive illusions. Psychologists and artists have discovered and developed hundreds of cognitive optical illusions. Some illusions cause us perceive motion where there is none, wrongly assign size or colour, or make us see shapes where there is only space. The mind interprets the information it receives, which means that our perception deviates from reality. This neurological fact makes optical illusions a perfect tool for magicians and of high interest to psychologists.

Scientists systematically studied optical illusions since 1855 when German psychologist Joseph Oppel published a paper on this topic. Oppel described so-called geometrical optical illusions, which are simple line drawings as ab-

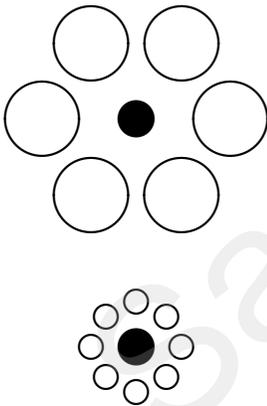
stractions of reality. Since this first publication, thousands of books and papers have been written on this topic. The figure on this page shows four of the most common versions.



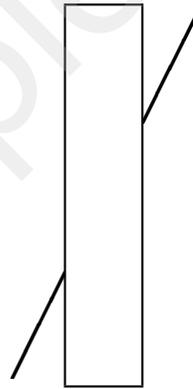
(a) Müller-Lyer Effect (1889)



(b) Ponzo Illusion (1928)



(c) Ebbinghaus Illusion (1898)



(d) Poggendorf Illusion (1860)

*Geometric Optical Illusions.*

One of the simplest illusions is the Müller-Lyer effect (a). The two horizontal lines have the same length, but the inward or outward arrow heads confuses the mind in thinking that the horizontal lines are not the same size. This effect also works when using circles or squares instead of arrowheads, creating a dumb bell shape. German psychologist Franz Carl Müller-Lyer first published this illusion in a paper about fifteen geometric illusions in 1889.

## Chapter 3

# The Jastrow illusion as a Magic Trick

Magicians use a large range of techniques to perform magic, and optical illusions form an integral part of the conjurer's toolkit. The designers of large-scale stage illusions rely on the principles of optical illusions. The magician's assistant hides in meticulously designed boxes that seem smaller than they actually are or that appear empty when they are not. The craft of illusion design requires a good grasp of the psychology of optical illusions. The discrepancy in space is never revealed as the optical illusion is not the effect, but forms part of the method. Besides large boxes used to mutilate beautiful women, there is a range of smaller pieces of theatrical magic that use optical illusions. The Marlo Tilt is a well-known card sleight that relies on a visual illusion. In this move, the magician appears to place a card in the middle of the deck. In reality, the top card is slightly tilted, and the card is placed second from the top. The distance between the tilted top card and the inserted card creates the optical illusion that the card is placed in the middle.

In these two examples, optical illusions are used as a secret method, but are not part of the magical effect. Magic tricks for which the effect itself is an optical illusion are usually not very strong because audiences are aware of their existence. The biggest problem with presenting optical illusions as a magical trick

is that the method quickly becomes evident. Alleviating this problem requires adding additional layers of deception or an engaging presentation to increase the magical appeal of the routine.

The boomerang illusion is the only optical illusion effect that has stood the test of time as it can be easily enhanced with other deceptive techniques and it allows for entertaining presentations. Despite its strength, it is not often used by performers other than children's entertainers. The basic problem is that there is only one effect, without a natural finish. This chapter describes some of the versions that have been published in the magic literature and marketed in magic shops over the past century. This chapter closes with a systematic description of the techniques and presentations used with the boomerangs to inspire the reader to create new versions of this old principle.

### **The boomerang illusion**

Magicians have performed the boomerang illusion for almost as long as psychologists have studied it. Over the past century, a wide variety of versions of this illusion has been published and marketed under many different names. The oldest known reference to the Jastrow illusion as a magic trick is from a 1916 book by Will Goldston, a popular English magician of the first half of the twentieth century. Goldston uses two boomerang shapes with boy scouts drawn on them. The trick is presented as a guessing game, proving the spectator wrong after they point out which of the boy scouts is the largest. Goldston also sold the props for a mere three pennies, which is about one US Dollar in current money.

The first widely commercially available version of this illusion uses the inherently magical boomerang to provide context to the routine. Legendary magic trick manufacturer P&L marketed the *Stretch-It Boomerang Sticks* in the nineteen thirties. These are brightly painted boomerang shapes, one of which contains a gimmick to secretly shorten it. The original advertising by L&L states that the patent for the gimmick was pending, the prop itself has a stamp that claims the trick is patented. P&L and its owners owned several patents, but a review of the official registers does not reveal any patent having been issued for this trick. Irrespective of the patent claims, the P&L version has been copied sev-

# STRETCH-IT-(Petrie's NEW BOOM-E-RANG)



## Professional Size

The best all around club, parlor, or stage effect since the P-L. Vanishing Wand.

**PRESENTATION:**—Two sticks resembling Boomerangs are shown—each painted a different color. You now explain that they were purchased for two boys who always quarreled over everything. Immediately upon receiving them—they placed them together and discovered that one was a trifle longer than the other. Being a magician you take the shorter one and start to stretch it only to discover that this stick has now become the longer. You now decide to “shrink” it again by placing the short stick on the longer one. The longer one “pushed down” in size until the sticks are exactly the same length.

Now for the Petrie “Stretch-it” effect:—Give one of the sticks to a member of the audience, who is taught how to stretch it and also shrink it—but to everyone’s amazement—upon command, he can no longer do either, thus leaving the two sticks in his hands different lengths. This effect is just what you’ve been dreaming of—*Real Magic Plus Comedy*—and with a “sucker” effect for the wise ones.

**WARNING:** This effect as well as the “Blooming Flower Bush” is protected by patents pending.

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P&L Stretch-It Boomerangs (*The Sphinx*, January 1935, p. 350).

eral times. Max Andrews’ Vampire Studios in London sold the gimmicked prop as *Beaumont’s Boomerangs* in the forties and fifties. Viking Magic and Magic Makers currently sell the original P&L designs as the *Baffling Boomerangs*.

Another popular version is a *Tale of Two Fish*, published by the now defunct Supreme Magic Company in England. In this routine the magician tells a story about two fishermen arguing about who caught the largest fish. Two funny looking fish are shown that appear to be the same size. One is then shown to be several inches longer than the other. The loser proceeds to cut a bit off the opponent’s fish after which his fish is the longer of the two. Alternately bits are cut from each fish to equalize the size until only the tails remain.

A rare and interesting innovation to the boomerang illusion is the *Pad-O-Rang*, developed around 1955 by Hollywood magician Merv Taylor. This version adds another dimension by turning the arches into a paddle trick. It consists of two acrylic boomerangs with a small handle that can be used to demonstrate the optical illusion and combine it with the paddle move to show colour changes.

## Chapter 4

# Closing

Magicians have over the past century been creative in seeking ways to incorporate the Jastrow illusion in their repertoire. The boomerang illusion has seen many interpretations and is, without a doubt, the most famous piece of magic based on an optical illusion. Magicians often lament that performing this optical illusion as an effect is not magic. This lack of magic is true in the sense that these tricks will not ‘kill’ or ‘fry’ your audience, but it certainly can create a magical experience.

Magic is often based on a difference in power between the magician and the spectator. Strong visual effects demonstrate that the magician has more knowledge and skill than the spectator. Using the Jastrow illusion as a magic trick provides a moment in a show where the balance of power is temporarily restored. The recent viral internet video shows how strong this illusion can be. Performing the boomerang illusion not about blowing people’s mind, but about sharing a natural miracle with your spectators.

This booklet contains a wealth of information on this otherwise unremarkable illusion. The psychological background is not only provided to satisfy intellectual curiosity, but also to inspire magicians to use this information in performances. The different techniques and presentational devices used by magicians illustrate the wealth of options available to perform this trick. I hope it will inspire others to develop their own versions and start a comeback of the boomerang illusion.

This work is based on extensive internet research in academic libraries, the *Conjuring Arts Research Centre*, *Lybrary.com* and the *Magic Café*. My thanks go to Jef Eaton, Harry Murphy, Darkwing, Bill Hegbli, Trekdad, Funsway, Dick Oslund, T.House, Hugmagic, Nums, and Enginemagic of the *Magic Café*. Australian magicians Barry Govan and Roy J. Hopwood have also helped me to write this book. Finally a big thanks to Dr. Akiyoshi Kitaoka and Richard Kaufman for giving permission to use their images.

I have strived for completeness writing this material, but there is certainly more to learn about the boomerang illusion. If you have any additional information about this illusion, then please share it with me. If you have any comments or suggestions about this booklet, please visit [magicperspectives.net](http://magicperspectives.net).

Sample

# Bibliography

## Publications by Psychologists

- Anonymous (1873). *The World of Wonders: A Record of Things Wonderful in Nature, Science, and Art*. Cassell, Petler, and Galpin, London, Paris & New York.
- Bartolomeo, P. (2014). Unilateral Spatial Neglect: Clinical Aspects. In *Attention Disorders After Right Brain Damage*, pages 49–83. Springer, London.
- Braine, M. D. and Shanks, B. L. (1965). The development of conservation of size. *Journal of Verbal Learning and Verbal Behavior*, 4(3):227–242.
- Chouinard, P. A., Unwin, K. L., Landry, O., and Sperandio, I. (2016). Susceptibility to optical illusions varies as a function of the autism-spectrum quotient but not in ways predicted by local–global biases. *Journal of Autism and Developmental Disorders*, 46(6):2224–2239.
- Imai, S. (1960). Experiments on Jastrow Illusion. *The Japanese Journal of Psychology*, 30(5):350–356.
- Jastrow, J. (1892). Studies from the Laboratory of Experimental Psychology of the University of Wisconsin. II. *The American Journal of Psychology*, 4(3):381.
- Maniatis, L. M. (2008). The Leaning Tower illusion is not a simple perspective illusion. *Perception*, 37(11):1769–1772.
- Martinez-Conde, S. and Macknik, S. L. (2012). All Deceptions Great and Small. *Scientific American Mind*, 23(3):16–18.
- Massironi, M., Antonucci, G., Pizzamiglio, L., Vitale, M. V., and Zoccolotti, P. (1988). The Wundt-Jastrow illusion in the study of spatial hemi-inattention. *Neuropsychologia*, 26(1):161–166.
- Müller-Lyer, F. (1889). Optische Urteilstauschungen. *Archiv für Anatomie und Physiologie*, (Supplement):263–270.
- Pick, D. F. and Pierce, K. A. (1993). Theoretical parallels between the Ponzo illusion and the Wundt-Jastrow illusion. *Perceptual and Motor Skills*, 76(2):491–498.

- Robinson, J. O. (1972). *The psychology of visual illusion*. Hutchinson university library. Psychology. Hutchinson, London.
- Tomonaga, M. (2015). Fat Face Illusion, or Jastrow Illusion with Faces, in Humans but not in Chimpanzees. *i-Perception*, 6(6).
- Tronick, E. and Hershenson, M. (1979). Size-distance perception in preschool children. *Journal of Experimental Child Psychology*, 27(1):166–184.
- Wundt, W. M. (1898). *Die Geometrisch-Optischen Täuschungen*. Leipzig, B. G. Teubner.

### Publications by Magicians

- Arch, D. (2012). *Magic That Matures*.
- Bateman, L. (1949). Yo-It-Chi. *Abracadabra*, 8(183):214–215.
- Brodahl, L. A. (2015). *Scripted! #1: Professors Nightmare and Fiber Optics Extended*.
- Carson, R. (1965). Jimmy Lake, president, Fellowship of Ministers Convention. *Linking Ring*, 45(2):111.
- Costi, D. (2004). Boomerangs. In *Close-Up Elegance*, pages 137–140. Anthony Brahams.
- Dayton, R. (1994). Fish sticks. *M-U-M*, 83(September):30–32.
- de Courcy, K. (1989). A tale of two fish. *Magigram*, 21(12):826–827.
- de Courcy, K. (1997). A brief talk on the banana. *Linking Ring*, 77(1):91–93.
- Eden, B. (1977). Magic from the 'perception' perspective. *Magic Circular*, 71:63–64.
- Freer, W. (2008). Boomerang Fish. In Karr, T., editor, *The Adventures of Winston Freer*. Miracle Factory.
- Ginn, D. (2010). Baffling boomerangs. *Magicana*, 57:10–13.
- Goldston, W. (1918). An Optical Illusion. In *Simple Conjuring Tricks That Anyone Can Perform*. C. Arthur Pearson, London, 3 edition.
- Govan, B. (1982). Yes Game. In *Close Up Magic Restaurant Style*, pages 48–50.
- Gower, H. (1962). Magic mudguards. *Abracadabra*, 33(833):4–6.
- Hildebrandt, D. (2006). *Other Stuff 3*. Lincoln.
- Hoy, D. (1957). The Bible and magic. *Linking Ring*, 37(3).
- Kaufman, R. (2016). Genii Speaks. *Genii*, 79(2):10–11.
- Kleefield, J. (2008). Boomerang Teach-In. *Linking Ring*, 88(5):84–85.
- Larsen, W. W. S. (1958). Conjuring for children. *Genii*, 22(10):441–446.
- Murray, G. and Jorgenson, T. (1990). *Color Changing Boomerangs*. Nielsen Magic.
- Pecor, C. J. (2001). The boomerangs revisited. *Linking Ring*, 81(5):108–109.
- Price, D. (1999). Color changing boomerangs. *M-U-M*, 89(June):36–38.

- Slater, R. H. (1944). Waves of the wand: The boomerangs. *The Magic Wand*, 33(203):98–99.
- Society of Indian Magicians (1947). Spell of India. *Linking Ring*, 27(10):64–65.
- Solomon, E. (2004). Tales Worth Telling.
- Spragg, B. (1959). Hocus Pocus Parade. *Linking Ring*, 38(11):43–46.
- Sweigard, M. (1968). The two banana illusion. *Linking Ring*, 48(1):72–73.
- von Weber, H. (1940). Money from magic. *Linking Ring*, 20(4):302–305.
- Walker, B. and Seaver, R., editors (1992). *The P&L Book*. Byron Walker, San Leandro.
- Wilson, G. (2013). *Tall Order*. Penguin Magic.