

1

00:00:00,000 --> 00:00:07,240

on this episode of myth busters don't tell them which ones we have adam and

2

00:00:07,240 --> 00:00:12,000

jayney outside their comfort zone in a footbaling myth that we would you know

3

00:00:12,000 --> 00:00:18,520

aspire to not be idiots they head for a hanger and hurl hail Mary's bang to see

4

00:00:18,520 --> 00:00:27,640

it hang time really is higher with helium and grant carry and Tory take a

5

00:00:27,640 --> 00:00:35,600

pot shot at a deadly myth as they aim to catch a bullet in their teeth oh my

6

00:00:35,600 --> 00:00:47,040

god and bluest teeth out Adam Savage and Jamie Heineman aren't trace around

7

00:00:47,040 --> 00:00:53,440

illegal between them over 30 years special effects experience that's what

8

00:00:54,200 --> 00:01:01,280

joining them Tory Bellachie science is fun carry Byron guess what I did today and

9

00:01:01,280 --> 00:01:07,720

grant imahara you guys ready for this they don't just tell them it's they put

10

00:01:07,720 --> 00:01:10,520

them to the test

11

00:01:10,520 --> 00:01:24,280

Adam we have a sporting myth only our second one and it's surprising given

12

00:01:24,280 --> 00:01:28,920

that we're such jocks exactly my thoughts when you kept into the flag team in

13

00:01:28,920 --> 00:01:34,560

Indiana back in like the 20s no wrong Jamie the myth is that if you fill a

14

00:01:34,560 --> 00:01:39,560

football with helium and you kick it or throw it that because it's lighter it

15

00:01:39,600 --> 00:01:44,240

will have more hang time and therefore it'll travel farther on the old helium

16

00:01:44,240 --> 00:01:52,360

football trick let's get going helium is lighter than air that's the scientific

17

00:01:52,360 --> 00:01:57,880

cornerstone of this sporting conundrum fill a blimp with it and you'll float but

18

00:01:57,880 --> 00:02:02,280

will it make a football fly further

19

00:02:02,280 --> 00:02:09,920

it's game day at the science bowl San Francisco City College

20

00:02:09,920 --> 00:02:14,760

that a long time since you walked on the gridiron huh I know I'm out of shape

21

00:02:14,760 --> 00:02:19,720

when just walking to the end of this field makes me out of breath luckily

22

00:02:19,720 --> 00:02:24,800

the kicker for today's test is fighting fit and ready to punt his way into the

23

00:02:24,800 --> 00:02:29,120

myth busters Hall of Fame yeah this is our punter Tim Sonneberg Tim Adam nice

24

00:02:29,160 --> 00:02:33,480

to meet you Tim Jamie nice to meet you so thinking give us a couple lessons and

25

00:02:33,480 --> 00:02:37,840

kicking the football got a few tips for you guys today the myth that we've heard

26

00:02:37,840 --> 00:02:42,200

that we're testing is that filling a football with helium will somehow make

27

00:02:42,200 --> 00:02:46,840

it fly farther than just a regular regulation football have you heard that

28

00:02:46,840 --> 00:02:50,840

oh that's that's been going on for eons as far back as I can remember and I

29

00:02:50,840 --> 00:02:55,640

don't even know where the heck I got it from but I that's been the rumor for

30

00:02:55,680 --> 00:03:00,400

years what kind of improvement do you think helium would land I believe helium

31

00:03:00,400 --> 00:03:06,280

would add a good five to ten yards to a good kick Tim's confident but is his

32

00:03:06,280 --> 00:03:12,240

opinion based on science or urban myth he's about to find out but first a

33

00:03:12,240 --> 00:03:18,320

crash course in kicking there's two types of kick in American football the

34

00:03:18,320 --> 00:03:23,320

kickoff features the end over end variety which gives maximum hang time and

35

00:03:23,600 --> 00:03:30,800

is hard to catch the punt is for distance and accuracy by imparting spin to

36

00:03:30,800 --> 00:03:36,520

the ball off the foot this spiral kick generates less drag and so flies further

37

00:03:36,520 --> 00:03:43,400

making it spot-on for this myth Jamie I know it's been like 40 or 50 years but

38

00:03:43,400 --> 00:03:49,120

you ready to put on your old armor and what is the point of this I could see

39

00:03:49,560 --> 00:03:53,560

you bringing some shoes but the helmet and the shoulder pads are going to be

40

00:03:53,560 --> 00:03:56,560

for what purpose it's just amazing to me that you still don't realize we're

41

00:03:56,560 --> 00:04:03,280

shooting a TV show well yeah but we would you know aspire to not be idiots

42

00:04:03,280 --> 00:04:10,520

and yet we would fail all right let's start the lesson okay so walking through

43

00:04:10,520 --> 00:04:14,640

like I'm your kid nephew it's about my skill level

44

00:04:15,520 --> 00:04:24,720

dude that's amazing you made that look way too easy it would be if you just if

45

00:04:24,720 --> 00:04:29,560

you walk into it a couple of handy hints and the rookies ready for his premier

46

00:04:29,560 --> 00:04:36,920

punt just normal steps all right and before you can say hang time no spiral

47

00:04:36,920 --> 00:04:44,560

the balls back on the ground all right your turn okay let's your foot go

48

00:04:44,600 --> 00:04:51,800

kick the ball sports fans may want to look away now that's all coming back to

49

00:04:51,800 --> 00:05:00,320

you isn't it yeah that was so bad it's worth another look well I totally sucked

50

00:05:00,320 --> 00:05:06,520

at that but you know football is not my sport in fact there really aren't any

51

00:05:06,520 --> 00:05:12,680

sports that are mine it seems that just as white men couldn't jump myth busters

52

00:05:12,720 --> 00:05:21,880

can't putt oh I see except in this case there's no twist to the tail they just

53

00:05:21,880 --> 00:05:26,080

can't hard if I was doing the kicking for this test we would be able to draw

54

00:05:26,080 --> 00:05:30,520

some conclusions and those conclusions would be that I suck at kicking oh I

55

00:05:30,520 --> 00:05:38,520

think we should get Tim to kick the balls for us because he's really good hmm

56

00:05:38,560 --> 00:05:43,840

big sense Tim takes care of the kicking while Adam and Jamie take care of the

57

00:05:43,840 --> 00:05:48,240

nerding I brought a bunch of meters for the weather conditions just to make sure

58

00:05:48,240 --> 00:05:51,080

you know we've got comparisons on everything and I think we should just

59

00:05:51,080 --> 00:05:55,000

keep on checking the wind speed okay well while you're doing that I'll break

60

00:05:55,000 --> 00:06:01,800

out the brand-new regulation balls are filled to exactly 13 psi which is what

61

00:06:01,800 --> 00:06:07,880

is required oh excellent never been used but is that 13 psi of helium or air

62

00:06:08,080 --> 00:06:13,880

ball feels a little light so filled with helium well we can tell you that

63

00:06:13,880 --> 00:06:19,640

could we are we skew the results so we'll tell you afterwards how's that here

64

00:06:19,640 --> 00:06:25,800

we go test number one punt number one Tim does his best to produce five

65

00:06:25,800 --> 00:06:34,040

identical kicks downfield Adam records the distance of each one for test

66

00:06:34,080 --> 00:06:39,120

number two the balls are emptied then refilled with the other gas once again

67

00:06:39,120 --> 00:06:44,640

it's crucial to the experiment that its identity remains secret okay these are

68

00:06:44,640 --> 00:06:54,760

ready don't tell them which ones we have see how far they go yeah four yards

69

00:06:54,760 --> 00:07:00,880

Tim puts up another five punts this time with helium filled balls so what were

70

00:07:00,920 --> 00:07:06,040

the results and did he spot the difference from your standpoint what do

71

00:07:06,040 --> 00:07:08,920

you think between the first two sets of balls what were you kicking first and

72

00:07:08,920 --> 00:07:13,000

what were you kicking second it felt like the first set of balls I kicked were

73

00:07:13,000 --> 00:07:16,320

filled with helium your first set of balls were actually regulation balls

74

00:07:16,320 --> 00:07:21,880

filled 13 psi with just regular air wow I would have thought that those were the

75

00:07:21,880 --> 00:07:27,120

helium balls well the second set was the helium balls that's surprising what's

76

00:07:27,160 --> 00:07:31,800

more even though Tim didn't pick them the helium balls did travel further than

77

00:07:31,800 --> 00:07:38,080

the airfield ones by an average of three yards but is that data reliable it

78

00:07:38,080 --> 00:07:43,200

looks like it supports the myth that helium does fly farther than air but

79

00:07:43,200 --> 00:07:47,440

unfortunately kick-to-kick we're looking at a difference of like up to 20 yards

80

00:07:47,440 --> 00:07:52,400

sometimes and when I see a difference of that between two data points I just

81

00:07:52,400 --> 00:07:56,720

don't look at my average as being a real number I'm not ready to call this one

82

00:07:56,760 --> 00:08:02,560

busted plausible or confirmed yet I don't think we have enough real data

83

00:08:04,480 --> 00:08:13,040

three back at the myth busters lot it's a splatter fest carries up before the

84

00:08:13,040 --> 00:08:17,160

paintball firing squad but she's taking it on the chin

85

00:08:17,480 --> 00:08:19,480

oh

86

00:08:21,480 --> 00:08:28,920

I'm fine is this just pointless but enjoyable victimization or might there be

87

00:08:28,920 --> 00:08:38,400

some myth busting in there somewhere my guess a little of both

88

00:08:38,400 --> 00:08:47,840

grant what myth have you brought us today the myth is you can catch a bullet

89

00:08:47,840 --> 00:08:52,000

that's fired at you in your teeth I always thought that that was just a

90

00:08:52,000 --> 00:08:55,800

magic trick that people did well there are people out there that claim that

91

00:08:55,800 --> 00:08:59,240

they can do it so what are you guys gonna do Tori and you are gonna fire guns

92

00:08:59,240 --> 00:09:05,560

at each other's faces and get some target practice well almost that's

93

00:09:05,600 --> 00:09:10,880

exactly what the boys in the bullet catching business claim they do here's

94

00:09:10,880 --> 00:09:16,760

a clip from the 1952 show you asked for it would you now give the bullet to mr.

95

00:09:16,760 --> 00:09:23,520

shores like to have him place it in the gun and then in firing position if you

96

00:09:23,520 --> 00:09:32,840

will ready aim fire make up your own minds is this superman in disguise or

97

00:09:33,000 --> 00:09:36,600

did he have more than just his tongue in his cheek but I see that bullet please

98

00:09:36,600 --> 00:09:42,200

Carrie Grant and Tori are going to find out they'll run a three-part experiment

99

00:09:42,200 --> 00:09:48,680

first they'll run tests to see if teeth can withstand the force of a bullet

100

00:09:49,680 --> 00:09:54,960

next put human reflexes under the gun to see if they're quick enough to catch a

101

00:09:54,960 --> 00:10:00,280

bullet it's a little scary and just in case they find that shock horror it is

102

00:10:00,320 --> 00:10:04,720

only a conjuring trick they're going to try and build a rig to catch a bullet

103

00:10:04,720 --> 00:10:14,440

traveling at almost a thousand feet per second first up the teeth strength test

104

00:10:14,440 --> 00:10:23,640

and Tori's found a set of dentures so we're gonna do is put a bullet in a

105

00:10:23,640 --> 00:10:28,840

pair of teeth with average biting strength and give it the amount of kinetic

106

00:10:28,880 --> 00:10:34,840

energy that a bullet would have if it were fired from a gun and we'll see if

107

00:10:34,840 --> 00:10:40,880

the jaws can hang on to the bullet then you do and you are able to dissipate

108

00:10:40,880 --> 00:10:45,120

that kinetic energy if you're not able to dissipate it the bullet will come

109

00:10:45,120 --> 00:10:49,160

flying out of the teeth here's the plan the bullet will be clenched in the

110

00:10:49,160 --> 00:10:54,240

dentures which will be held shut using air pressure from a pneumatic cylinder

111

00:10:55,000 --> 00:11:00,080

a weighted pendulum will swing down to strike a metal pin which will hit the

112

00:11:00,080 --> 00:11:05,640

bullet delivering the same amount of force as a shot fired from a gun Grant

113

00:11:05,640 --> 00:11:10,160

explains now of course the bullet is very small and it's traveling very fast

114

00:11:10,160 --> 00:11:14,920

we won't be able to have whatever we're making travel quite that fast so we have

115

00:11:14,920 --> 00:11:21,560

to compensate by having it be much heavier something else to chew over the

116

00:11:21,600 --> 00:11:25,960

teeth have to be biting down on the bullet with regular human force but how

117

00:11:25,960 --> 00:11:33,160

strong is that Tori wraps his jaws around a force gauge 117.10 his best

118

00:11:33,160 --> 00:11:41,120

bite 117 newtons or 85 pounds of pressure Grant calculates that to match the

119

00:11:41,120 --> 00:11:46,960

kinetic energy of a bullet the pendulum must carry a 50 pound load and swing

120

00:11:47,000 --> 00:11:53,560

from a height of four feet it's enough to set your teeth on edge Grant

121

00:11:53,560 --> 00:11:58,560

pressurizes the choppers to match Tori's bite strength

122

00:12:02,720 --> 00:12:08,320

and all these jaws want for Christmas is their two front teeth time for a

123

00:12:08,320 --> 00:12:14,760

rethink take two with the bullet at the back of the jaws the pin is lined up to

124

00:12:14,800 --> 00:12:20,720

hit the slug head on 50 pounds comes swinging in from four feet

125

00:12:20,720 --> 00:12:21,720

one

126

00:12:25,720 --> 00:12:28,600

Wow is the bullet still in there?

127

00:12:28,600 --> 00:12:29,800

Well it's still in the teeth

128

00:12:29,800 --> 00:12:33,800

let's take a look at the high speed and see exactly what happened okay

129

00:12:35,300 --> 00:12:40,800

the bullet's still there and the teeth apart from one or two chips are still intact

130

00:12:41,600 --> 00:12:47,160

that is some really unexpected results I hadn't I wouldn't have predicted that in a

131

00:12:47,160 --> 00:12:53,120

million years the dentures with Tori's bite force were actually able to hang

132

00:12:53,120 --> 00:12:58,480

on to the bullet which is very surprising result and it lends a little

133

00:12:58,480 --> 00:13:02,840

bit of credence to something that so far we are all assuming is an illusion

134

00:13:02,840 --> 00:13:07,520

hanging on to the bullets one thing but you have to be fast enough to catch it

135

00:13:07,560 --> 00:13:13,560

in the first place could anyone really bite down on a speeding slug

136

00:13:13,560 --> 00:13:16,560

which one of you is Granny Mahara?

137

00:13:16,560 --> 00:13:21,560

the team's going to test human reaction time to a pistol shot

138

00:13:21,560 --> 00:13:26,760

as soon as you hear or see something that tells you that I fired the gun

139

00:13:26,760 --> 00:13:30,080

you're gonna try to close down your mouth and see if you could physically

140

00:13:30,080 --> 00:13:35,560

possibly catch it by the way so Grant doesn't die they're using blanks and a

141

00:13:35,600 --> 00:13:40,080

bullet proof plastic sheet in three two one

142

00:13:47,040 --> 00:13:50,760

we all know that Carrie's quick on the draw when it comes to opening her mouth

143

00:13:52,200 --> 00:13:55,480

but it turns out she can shot it fairly smartly too

144

00:13:55,480 --> 00:14:00,760

Carrie had the fastest reaction time with nine milliseconds

145

00:14:00,760 --> 00:14:04,360

no is that with or without the countdown that is with a preemptive

146

00:14:04,360 --> 00:14:07,880

countdown well I mean we've shown that it's possible that you could time it so

147

00:14:07,880 --> 00:14:11,920

you could grab the bullet but that's a total crapshoot I mean it's it's luck

148

00:14:11,920 --> 00:14:15,920

so why don't we do a test where we could see if you could actually grab a

149

00:14:15,920 --> 00:14:22,080

projectile a projectile like a paintball perhaps I think you got a real

150

00:14:22,080 --> 00:14:25,960

good chance of catching these Tari's gonna fire paintballs from the distance of

151

00:14:25,960 --> 00:14:31,080

25 feet and Carrie's gonna try to catch them now we've already seen what a

152

00:14:31,120 --> 00:14:36,640

well-aimed paintball can do I know you want to keep aiming at that spot but

153

00:14:36,640 --> 00:14:43,680

can you not aim right at that spot again in a previous episode Adam and Jamie

154

00:14:43,680 --> 00:14:49,720

held a paintball duel to see who could withstand the most pain and claim the

155

00:14:49,720 --> 00:14:57,240

title of ultimate myth buster this sucks I don't want to do this anymore

156

00:14:57,280 --> 00:15:02,920

needless to say Adam lost yeah I keep forgetting that you're like actually

157

00:15:02,920 --> 00:15:09,560

have no heart or soul and given the smirk neither has Tori it might pay to

158

00:15:09,560 --> 00:15:17,280

don some suitable protection undaunted Carrie steps up to the plate suddenly

159

00:15:17,280 --> 00:15:22,040

this seems sort of like a bad idea is he gonna be fine Carrie you just gonna

160

00:15:22,080 --> 00:15:27,320

have a few welts you're gonna love it do a test fire I want to see how fast it

161

00:15:27,320 --> 00:15:35,000

goes you got it the answer 300 feet per second holy it's gonna take a few trials

162

00:15:35,000 --> 00:15:40,240

here that's okay I don't mind I could do this all day you know here on myth

163

00:15:40,240 --> 00:15:45,200

busters one tries not to approach any experiment with a preconceived notion as

164

00:15:45,200 --> 00:15:53,560

to the outcome good luck thanks fire but in this case one thinks one can make

165

00:15:53,560 --> 00:15:57,520

an exception fire

166

00:15:58,400 --> 00:16:05,360

that's close really no I can't even see it if you can't catch this there's no

167

00:16:05,360 --> 00:16:09,240

way you're gonna be able to catch a bullet at 200 miles per hour a paintball

168

00:16:09,240 --> 00:16:14,080

is only traveling one-third the speed of the slowest bullet I can see it coming

169

00:16:14,080 --> 00:16:18,800

at me but by the time I can process the fact that my hand needs to grab on to it

170

00:16:18,800 --> 00:16:22,520

it's already hit me I'll see if I can't take the force for the projectile and

171

00:16:22,520 --> 00:16:28,560

stop it from breaking that's it yeah go ahead tell us how that works out three

172

00:16:28,560 --> 00:16:37,840

two one oh that look pretty cool oh getting shot in the hand is one thing

173

00:16:37,840 --> 00:16:43,160

palming a paintball is quite another the guys better think quick if they want to

174

00:16:43,200 --> 00:16:47,960

catch a bullet if you can't do their hands there's no way I'm gonna do it

175

00:16:47,960 --> 00:16:56,200

Adam and Jamie have been taking a punt at the myth that a helium filled

176

00:16:56,200 --> 00:17:01,840

football will fly further than an air filled one but even with a specialist

177

00:17:01,840 --> 00:17:09,800

kicker the data were all over the park back at m5 the guys are having a rethink

178

00:17:13,520 --> 00:17:18,960

and that done they have a discussion the best place kicker in the world really

179

00:17:18,960 --> 00:17:24,200

can't make a football land in the same spot twice in a row there's too much too

180

00:17:24,200 --> 00:17:29,120

much variance between the kicks we need to go back to the shop and get a lot

181

00:17:29,120 --> 00:17:33,560

more scientific about this well let's look at the very first part of this does

182

00:17:33,560 --> 00:17:38,000

helium actually make a football lighter let's carefully weigh some helium filled

183

00:17:38,000 --> 00:17:42,080

footballs and some air filled footballs and see what if any difference there

184

00:17:42,120 --> 00:17:47,800

actually is to weigh gases they'll need some precision equipment and they have a

185

00:17:47,800 --> 00:17:53,560

gem of an idea a specialist store for jewelers we're here to purchase a scale

186

00:17:53,560 --> 00:17:59,040

that's extremely accurate and these kinds of places specialize in jewelry and

187

00:17:59,040 --> 00:18:02,480

such so you know stuff like gold you kind of want to be accurate about how much

188

00:18:02,480 --> 00:18:07,840

it weighs with helium versus air in the balance the scales must be super

189

00:18:07,840 --> 00:18:14,840

sensitive think we should weigh my wedding ring that's huge look at that

190

00:18:14,840 --> 00:18:20,560

11 grams of solid gold let's see whether it will pick up a pig whoo whoo

191

00:18:20,560 --> 00:18:25,240

it measures a post it well it goes to a tenth of a gram that's that's point oh

192

00:18:25,240 --> 00:18:32,000

oh oh two five pounds yeah that's like a quarter of a thousandth of a pound all

193

00:18:32,000 --> 00:18:36,920

right we'll take it the jewelry store job goes like clockwork and it's back to m5

194

00:18:36,960 --> 00:18:42,160

for the weigh in footballs can vary in weight by up to seven grams so they

195

00:18:42,160 --> 00:18:48,480

numbered the balls and record their dead weight then they fill them up with the

196

00:18:48,480 --> 00:18:54,600

regulation amount of air 13 psi well this is actually pretty cool I'm getting

197

00:18:54,600 --> 00:18:59,080

almost exactly a difference of 3.2 grams which means we're filling this with 3.2

198

00:18:59,080 --> 00:19:03,160

grams of air I never would have guessed that I would have thought it was like

199

00:19:03,200 --> 00:19:08,000

one tenth of a gram maybe yeah yeah it's it's pretty amazing air weighs more

200

00:19:08,000 --> 00:19:13,160

than you'd think put a cylinder around the Eiffel Tower and the air inside will

201

00:19:13,160 --> 00:19:20,440

weigh more than the tower itself food for thought okay so what's next I think

202

00:19:20,440 --> 00:19:24,400

we have to deflate these and fill them with helium next as everyone knows

203

00:19:24,400 --> 00:19:29,200

inhaling lighter than air helium gives you a high-pitched voice it's

204

00:19:29,240 --> 00:19:34,480

predictable juvenile and dangerous behavior in other words irresistible

205

00:19:34,480 --> 00:19:41,040

it's weird talking without any oxygen in your system wow

206

00:19:41,040 --> 00:19:44,040

hmm

207

00:19:45,040 --> 00:19:48,400

you could die that way yeah I know I always have to stop when my lips get

208

00:19:48,400 --> 00:19:53,760

blue so two issues there helium makes your voice sound funny and it can kill

209

00:19:53,760 --> 00:19:59,180

you yeah that seems just fine first the funny bit it's all to do with the

210

00:19:59,180 --> 00:20:04,180

speed at which the sound of your voice travels through air I reject your

211

00:20:04,180 --> 00:20:08,740

reality and substitute my own and through helium I reject your reality and

212

00:20:08,740 --> 00:20:13,100

substitute my own helium is only half as dense as air so sound travels through it

213

00:20:13,100 --> 00:20:18,340

almost twice as fast this doubles the frequency making it sound squeaky the

214

00:20:18,340 --> 00:20:23,740

second issue is much simpler humans don't work on helium so don't try it at

215

00:20:24,740 --> 00:20:31,780

back at the way it it's actually almost seven grams different between the helium

216

00:20:31,780 --> 00:20:35,300

filled football at regulation pressure and the air filled football at

217

00:20:35,300 --> 00:20:40,300

regulation pressure and what's more it turns out that even an empty ball weighs

218

00:20:40,300 --> 00:20:44,900

more than a helium filled one even though I know a helium balloon will float up

219

00:20:44,900 --> 00:20:48,300

in the air because helium is lighter than air I didn't expect that helium even a

220

00:20:48,300 --> 00:20:52,660

small amount like three and a quarter psi of helium would actually reduce the

221

00:20:52,700 --> 00:20:57,100

weight of the football by probably almost a full percentage point it doesn't

222

00:20:57,100 --> 00:21:01,820

sound much but if the myth's correct the weight loss provided by helium could

223

00:21:01,820 --> 00:21:05,740

turn an ordinary kick into an extraordinary one

224

00:21:05,740 --> 00:21:07,740

this one out the back of the end zone again

225

00:21:11,340 --> 00:21:15,020

amazingly our researchers might have actually turned up the source of this

226

00:21:15,020 --> 00:21:20,340

myth which is a punter who played for the Oakland Raiders from 73 to 1986 by the

227

00:21:20,380 --> 00:21:26,260

name of Ray Guy yeah his punts stayed in the air so long and they went so high

228

00:21:26,260 --> 00:21:30,900

that the NFL actually had to come up with a statistical term for it which they

229

00:21:30,900 --> 00:21:37,740

called hang time during the course of the day and that everything I hit was at

230

00:21:37,740 --> 00:21:42,100

least five seconds or better hang time and it was going exactly where I wanted

231

00:21:42,100 --> 00:21:46,460

to go as the story goes during a game in the 70s against the Houston Oilers one

232

00:21:46,500 --> 00:21:51,660

of his punts hung so long in the air that the ball was immediately collected

233

00:21:51,660 --> 00:21:56,620

and tested for the presence of helium once I hit it the ball just took off and

234

00:21:56,620 --> 00:22:00,740

seemed like he just stayed up there forever Billy a few years later told me

235

00:22:00,740 --> 00:22:04,660

that bum hollered at him told him say they get that football we're gonna take

236

00:22:04,660 --> 00:22:07,940

it back and have it analyzed because they thought I had helium in it you know

237

00:22:07,940 --> 00:22:15,100

which we have a pretty much a standing joke about it now there was no helium but

238

00:22:15,140 --> 00:22:19,820

despite the lack of evidence the myth persisted which is why it's found itself

239

00:22:19,820 --> 00:22:26,060

on this show that's enough historical background time for a gratuitous

240

00:22:26,060 --> 00:22:31,300

explosion the question we're gonna answer here is how much pressure can a

241

00:22:31,300 --> 00:22:35,740

football actually take before it bursts we don't really need to answer that

242

00:22:35,740 --> 00:22:41,500

question but you know get to blow something up okay you ready

243

00:22:49,500 --> 00:22:57,740

that was great oh look at that that was about 110 pounds per square inch so

244

00:22:57,780 --> 00:23:06,660

there's your answer at 110 psi you'll lose a football that's really cool but

245

00:23:06,660 --> 00:23:16,980

gain a hat what are you doing put everything on my head the bullet in

246

00:23:16,980 --> 00:23:21,820

the teeth myth hasn't quite bitten the dust but it's shot full of holes now

247

00:23:21,860 --> 00:23:27,660

grads come up with a plan and he's aiming high I think we need to build

248

00:23:27,660 --> 00:23:31,620

something that'll be able to catch a bullet and so you're gonna build some

249

00:23:31,620 --> 00:23:36,340

kind of a rig that'll catch it yeah be able to sense when the bullet comes and

250

00:23:36,340 --> 00:23:41,940

time it so that it closes the teeth at the exact right moment he's planning a

251

00:23:41,940 --> 00:23:48,260

25-foot course with a gun at one end and a set of metal jaws at the other when

252

00:23:48,300 --> 00:23:52,860

the guns trigger is activated by a remote firing mechanism it sends a signal

253

00:23:52,860 --> 00:23:58,780

to a digital timer on the pneumatic jaws by calculating how long it takes for the

254

00:23:58,780 --> 00:24:04,260

bullet to reach them grant can program a delay so the jaws fire at precisely the

255

00:24:04,260 --> 00:24:09,660

right moment building the rig isn't the problem grant has plenty of experience

256

00:24:09,660 --> 00:24:16,900

with remote controls and pneumatic actuators from his robot designs like

257

00:24:16,940 --> 00:24:25,420

great comedy one the secrets in the timing okay using the high-speed camera

258

00:24:25,420 --> 00:24:30,820

grant works out that the bullet will reach the jaws in just 23 milliseconds

259

00:24:30,820 --> 00:24:39,580

the punchline is that's exactly how long it takes for the jaws to shut so the

260

00:24:39,580 --> 00:24:44,300

next question is how long does it take the bullet to exit the muzzle after the

261

00:24:44,300 --> 00:24:48,980

trigger has been squeezed I have a little light in there that turns on when I

262

00:24:48,980 --> 00:24:53,100

trigger it so we're gonna see the time delay between when the light turns on

263

00:24:53,100 --> 00:25:01,420

when a bullet actually comes out of the muzzle three two one that's 43

264

00:25:01,420 --> 00:25:06,100

milliseconds so maybe I do trigger them both at the same time and it'll be really

265

00:25:06,100 --> 00:25:11,260

close while grant crunches the numbers Tari wants a second bite at the

266

00:25:11,300 --> 00:25:16,860

pendulum test he's got doubts about the dentures the test was a kick in the

267

00:25:16,860 --> 00:25:21,220

teeth for the skeptics as the acrylic choppers coped with the kinetic energy

268

00:25:21,220 --> 00:25:26,700

of a speeding bullet but real teeth might not be so resilient they've got a

269

00:25:26,700 --> 00:25:34,300

hard enamel coating but the inside is a soft material called Denton so where to

270

00:25:34,300 --> 00:25:39,020

get some real choppers to chew on well we can always go get a pig head we could

271

00:25:39,060 --> 00:25:41,940

you know take the jaws from the pig and that would be a much better

272

00:25:41,940 --> 00:25:45,700

representation than the plastic teeth I mean they're a lot stronger than a

273

00:25:45,700 --> 00:25:50,100

human's but I mean if we can prove that the pig head can't hold a bullet and

274

00:25:50,100 --> 00:25:53,120

there's no way a human could can we find a story where we don't work in dead

275

00:25:53,120 --> 00:25:58,820

animals for real sure Carrie when pigs fly not it I don't want to go pick them

276

00:25:58,820 --> 00:26:06,900

up not it I got something else to work on which makes Tari lucky last and he's

277

00:26:06,940 --> 00:26:14,440

the only one with the stomach to cut out the jaws Tari gets gory

278

00:26:21,260 --> 00:26:25,020

Carrie did you want the snout because I was gonna throw it away unless you

279

00:26:25,020 --> 00:26:30,300

wanted that is probably one of the most disgusting things I've ever seen and I'm

280

00:26:30,300 --> 00:26:35,620

trying to stay in my happy place as they say on the cooking shows here's one

281

00:26:35,660 --> 00:26:40,100

we prepared earlier I have my jaws my teeth from the pig and I have the

282

00:26:40,100 --> 00:26:45,260

cylinder through it all I have to do now is mount it to our rig and then we'll

283

00:26:45,260 --> 00:26:49,900

test it see if it can actually hold a bullet biting the bullets not a problem

284

00:26:49,900 --> 00:26:54,420

but the teeth in front of it have to be filed down so the steel rod has a clear

285

00:26:54,420 --> 00:26:59,780

path to the slug that is the creepiest looking rig you made a meat puppet

286

00:26:59,780 --> 00:27:04,700

Carrie's trying to stay composed which is more than can be said of the pigs

287

00:27:04,740 --> 00:27:09,580

remains under the hot television lights getting right the pig heads start to

288

00:27:09,580 --> 00:27:14,860

smell right time to unleash that pendulum once more with 50 pounds of weight

289

00:27:14,860 --> 00:27:26,020

from a height of four feet it matches the force of a bullet three two one that

290

00:27:26,020 --> 00:27:33,460

was cool see the bullet flew right out of his mouth

291

00:27:34,740 --> 00:27:39,220

pig jaw is a lot stronger it has a lot more integrity than a human jaw this is

292

00:27:39,220 --> 00:27:42,980

this is a great test because if he couldn't hold on to a bullet there's no

293

00:27:42,980 --> 00:27:48,060

way a human can wait a human can hold on to a bullet quite probably but just to

294

00:27:48,060 --> 00:27:53,260

be sure let's see what happens when the pendulum is replaced by a 357 magnum

295

00:27:53,260 --> 00:27:58,740

with a 38 watt cutter round an old shipping container is now the myth

296

00:27:58,780 --> 00:28:05,460

musters very own firing range we have a bullet in the pigs teeth biting down at

297

00:28:05,460 --> 00:28:09,900

my bite pressure it's a lot like what we were doing with the pendulum test

298

00:28:09,900 --> 00:28:15,500

except we're gonna be firing a live round onto the bullet that's in the teeth

299

00:28:15,500 --> 00:28:22,780

all right here we go fire in the hole in three two one that settles it if a

300

00:28:22,780 --> 00:28:28,460

bullet does this to a pig's pegs that a human jaw has no chance oh my god it

301

00:28:28,500 --> 00:28:35,540

blew his teeth out it just blew his teeth out oh god so what if we learn

302

00:28:35,540 --> 00:28:40,460

from all this well one thing's for certain the so-called most dangerous

303

00:28:40,460 --> 00:28:45,820

trick in the world is just that a trick not a stunt I have one little warning

304

00:28:45,820 --> 00:28:50,020

now this is serious four men have been killed in attempting this feat it's a

305

00:28:50,020 --> 00:28:55,540

neat trick but let's leave it right there good idea let's face it it's humanly

306

00:28:55,580 --> 00:29:01,500

impossible to catch a speeding bullet but on this show that's no reason not to

307

00:29:01,500 --> 00:29:12,180

try and Grant's bullet catching rig is right on track in the high flying myth

308

00:29:12,180 --> 00:29:16,500

of the helium football Adam and Jamie have been weighing up the differences

309

00:29:16,500 --> 00:29:21,980

between air and helium not surprisingly we found the first element of truth in

310

00:29:22,020 --> 00:29:26,380

the story a helium filled football is shockingly lighter than a football filled

311

00:29:26,380 --> 00:29:30,220

with air yeah well now we need to determine whether that translates to a

312

00:29:30,220 --> 00:29:35,700

farther distance when it's kicked right yeah more hang time absolutely it's time

313

00:29:35,700 --> 00:29:39,780

for an indoor test indoor some large building where we can eliminate the

314

00:29:39,780 --> 00:29:43,620

weather variable and maybe we'll get one of those kicking machines to eliminate

315

00:29:43,620 --> 00:29:48,860

the human element in the kick which is probably a really big thing oh yeah the

316

00:29:48,900 --> 00:29:58,500

myth busters mechanical boot arrives that is scary it's usually used for

317

00:29:58,500 --> 00:30:06,820

catching practice but on this special team it's the big game kicker pretty

318

00:30:06,820 --> 00:30:16,740

scary thing this looks dangerous Jamie sets up a target at its first intent

319

00:30:18,900 --> 00:30:24,940

that's almost an exact replica of Adam's throwing arm for the second down he

320

00:30:24,940 --> 00:30:32,700

turns up the muscle ready yeah hey we hit the target but it's still not we're

321

00:30:32,700 --> 00:30:38,060

not getting a spiral Jamie consults the manual Adam dives straight in that's

322

00:30:38,060 --> 00:30:41,300

how things work around here

323

00:30:41,540 --> 00:30:47,660

hey that's a spiral was it it was a beautiful spiral pretty soon Adams as

324

00:30:47,660 --> 00:30:55,980

accurate as a seasoned quarterback now he's all excited I am excited

325

00:31:05,500 --> 00:31:10,460

who knew sport could be so much fun well that's good enough for me what's next

326

00:31:10,460 --> 00:31:14,820

what's next is we take that machine and a bunch of these balls and some helium and

327

00:31:14,860 --> 00:31:20,580

some air out to indoor stadium it's got to be indoors away from the weather and

328

00:31:20,580 --> 00:31:26,220

it's got to be big so the guys head for a location that's got all the space they

329

00:31:26,220 --> 00:31:35,060

need NASA's Ames facility at Moffitt Field this hanger should be big enough

330

00:31:35,060 --> 00:31:48,900

I've got vertigo just from the sheer size it's like not moving the way it should the

331

00:31:48,900 --> 00:31:55,380

hangar is so big the airplanes parked in it look like toys and this is the

332

00:31:55,380 --> 00:31:59,540

largest building I have ever been in it's about 230 feet to the ceiling it's

333

00:31:59,580 --> 00:32:05,900

nearly a quarter of a mile long and they parked blimps in these things even

334

00:32:05,900 --> 00:32:09,580

though a building this large can develop its own micro-weather systems and I'm

335

00:32:09,580 --> 00:32:14,060

not kidding there is no breeze there's no wind so it's the perfect place to test

336

00:32:14,060 --> 00:32:17,540

our football throwing machine and see if there is a difference in the hang time

337

00:32:17,540 --> 00:32:25,540

between helium and air and other stuff first they assemble today's MVP the

338

00:32:25,540 --> 00:32:28,540

kicking machine

339

00:32:30,420 --> 00:32:41,900

then Adam paces out the test area that's the length of a football field 100

340

00:32:41,900 --> 00:32:47,500

yards I can't imagine it's gonna fire farther than this

341

00:32:48,500 --> 00:33:00,180

that's kind of like a little too up in the air I think either the kickers

342

00:33:00,180 --> 00:33:05,860

having an off day that was not a spiral at all or there's a flag on the play of

343

00:33:05,860 --> 00:33:12,820

this myth-busting method it landed like this this is a problem we're gonna work

344

00:33:12,820 --> 00:33:17,060

this one out the way it's going now it's like a total disaster they're just

345

00:33:17,100 --> 00:33:21,780

landing all over the place yeah one's like 50 feet the other's 200 feet I was

346

00:33:21,780 --> 00:33:25,820

keeping my hand on every single one without that okay ready I'm gonna I'm

347

00:33:25,820 --> 00:33:32,100

gonna try this one it actually looks like a good spiral yeah it looked pretty

348

00:33:32,100 --> 00:33:39,660

good the hands-off approach is the way to go that's one of the farthest throws

349

00:33:39,660 --> 00:33:44,620

yeah that's beautiful and by jury rigging a firing mechanism with a bungee cord

350

00:33:44,660 --> 00:33:51,580

they maximize their chances of consistency I love it this is beautiful

351

00:33:51,580 --> 00:33:56,260

these are all landing just where I want with each kick on the same ballpark the

352

00:33:56,260 --> 00:33:59,460

first test can begin

353

00:34:00,340 --> 00:34:06,820

air 13 psi bungee cord ball number one

354

00:34:06,820 --> 00:34:18,860

haha doesn't get better than that hit the 200 foot mark okay ready Adam marks

355

00:34:18,860 --> 00:34:26,180

the landing spot of each ball all 10 are right on the money or close enough at

356

00:34:26,180 --> 00:34:34,660

least to get a suitable sample size they shoot off a second set of 10 to Adam

357

00:34:34,700 --> 00:34:40,420

satisfaction very very happy with that that bungee really evened everything out

358

00:34:40,420 --> 00:34:45,940

there's still a couple of anomalies but out of 10 only had three that's good

359

00:34:45,940 --> 00:34:54,660

enough for myth busters the myth that you can catch a bullet in your teeth has

360

00:34:54,660 --> 00:35:01,500

been shot to pieces but Grant's been building a rig that can do the trick for

361

00:35:02,260 --> 00:35:08,060

his pneumatic gnaz is are ready to bite the bullet and with live ammo involved

362

00:35:08,060 --> 00:35:12,620

the guys head for the firing range of the south San Francisco police department

363

00:35:12,620 --> 00:35:16,260

oh man this brings back memories

364

00:35:16,260 --> 00:35:19,260

yeah

365

00:35:22,260 --> 00:35:26,460

exactly 25 feet right there

366

00:35:26,460 --> 00:35:32,300

chief firearms instructor Sergeant Alan Normandy has agreed to supervise he's

367

00:35:32,300 --> 00:35:37,100

aided unabated before when the guys busted the blown away myth it was

368

00:35:37,100 --> 00:35:43,340

Sergeant Normandy who finally not bust her off his perch unfortunately he's

369

00:35:43,380 --> 00:35:48,060

also had firsthand experience with would be bullet catchers I've seen the

370

00:35:48,060 --> 00:35:52,740

aftermath of someone who's attempted that the damage is fairly devastating at

371

00:35:52,740 --> 00:35:55,940

a distance of 20 feet or so I would imagine that you're gonna have primarily

372

00:35:55,940 --> 00:36:01,460

just a puncture wound with a pistol round but still certainly go through the

373

00:36:01,460 --> 00:36:06,780

mouth cavity and whatever's behind it without much difficulty in this case the

374

00:36:06,780 --> 00:36:12,220

mouth is made of metal grants robotic jaws are designed to snap shut with just

375

00:36:12,260 --> 00:36:16,660

the right amount of delay to catch a speeding bullet fired from a remotely

376

00:36:16,660 --> 00:36:25,500

triggered gun 25 feet away the range is yours okay and loaded up you want it

377

00:36:25,500 --> 00:36:30,220

looks pretty good first they need to run some tests they fire a few rounds at the

378

00:36:30,220 --> 00:36:40,340

target to make sure they're hitting the same spot every shot all right it went

379

00:36:40,380 --> 00:36:45,020

right through the same hole that's good then they position the jaws in the

380

00:36:45,020 --> 00:36:50,460

firing line pressurizing the system and Grant activates the pneumatic actuator

381

00:36:50,460 --> 00:36:57,700

which will snap them shut and we are armed then he captures them closing on

382

00:36:57,700 --> 00:37:08,340

high-speed camera three two one and works out to the millisecond how long it

383

00:37:08,380 --> 00:37:13,500

takes them to shine I know how long it takes from when I trigger the gun to

384

00:37:13,500 --> 00:37:17,060

when the bullet comes out of the muzzle I know how long it takes from when I

385

00:37:17,060 --> 00:37:20,820

trigger the teeth to when they actually close and I know the distance and the

386

00:37:20,820 --> 00:37:25,140

speed of the bullet that's gonna tell me exactly how long I have to wait to

387

00:37:25,140 --> 00:37:30,380

trigger the jaws so that the bullet gets there exactly as they close Grant does

388

00:37:30,380 --> 00:37:39,060

the math based on a bullet traveling at over 850 feet per second so 857 feet

389

00:37:39,060 --> 00:37:45,140

per second and he comes up with a delay time on the jaws of 82 milliseconds

390

00:37:45,140 --> 00:37:51,820

okay he punches in the magic number so that 82 thousandths of a second after the

391

00:37:51,820 --> 00:37:58,940

gun fires the teeth will start to close everything is set Sergeant Normandy may

392

00:37:58,940 --> 00:38:04,500

I load absolutely good for the first time ever the bullet in the teeth trick

393

00:38:04,500 --> 00:38:19,100

is ready to be tried for real three two one you hit it wow wow it looks like it

394

00:38:19,100 --> 00:38:27,060

closed a little too soon Tori's right but that's pretty good for a first try

395

00:38:27,420 --> 00:38:33,020

looks like the jaws are closing a little soon so I'm gonna increase my delay by

396

00:38:33,020 --> 00:38:38,580

four and three-quarter milliseconds call it five and we should be ready to try it

397

00:38:38,580 --> 00:38:51,580

again in three two one I saw a little debris pop off there dude it's a perfect

398

00:38:51,580 --> 00:38:56,300

track where the lead has rubbed off against the steel that is really close

399

00:38:56,500 --> 00:39:01,300

Grant uses the high-speed camera to fine-tune the delay mechanism on the jaws

400

00:39:01,300 --> 00:39:06,620

by tracking the bullets progress frame by frame he can estimate how many

401

00:39:06,620 --> 00:39:12,220

milliseconds the jaws are missing by and make the correct adjustment okay one

402

00:39:12,220 --> 00:39:21,100

millisecond there we go in three two one the jaws are still missing by the

403

00:39:21,100 --> 00:39:25,660

skin of their teeth but the bullet either splatters on steel or goes straight

404

00:39:25,700 --> 00:39:29,500

down the gullet I don't think with these you're gonna see it's stuck in the

405

00:39:29,500 --> 00:39:32,500

mouth like a magician just caught it I think it's just gonna squish right on

406

00:39:32,500 --> 00:39:37,540

through even with precision timing down to thousands of a second it's still

407

00:39:37,540 --> 00:39:41,820

proving to be one tough trick to pull off there's absolutely no way the human

408

00:39:41,820 --> 00:39:46,780

response time could remotely catch a bullet it's it's I mean we've got

409

00:39:46,780 --> 00:39:49,900

timers this is the closest thing to a short thing that we could possibly have

410

00:39:49,900 --> 00:39:55,020

time to try a different set of metal mandibles these duck bills have a

411

00:39:55,060 --> 00:39:59,220

greater surface area maybe they'll be better able to hang on to the bullet

412

00:39:59,220 --> 00:40:10,180

three two one it's agonizingly close I can't say I'm totally surprised with

413

00:40:10,180 --> 00:40:14,420

the results but this is as close as welcome to our world this is this is as

414

00:40:14,420 --> 00:40:18,020

close I think is we're gonna get it it can be done we're right there on the

415

00:40:18,180 --> 00:40:29,100

threshold of it lots of shrapnel six shots in success that's gotta be it it

416

00:40:29,100 --> 00:40:33,820

looked like it just exploded that's gotta be it exploded inside the mouth when

417

00:40:33,820 --> 00:40:39,660

soft lead struck steel the bullet basically melted good job you guys we

418

00:40:39,660 --> 00:40:43,340

caught a bullet not much left of the bullet but we caught it I don't know

419

00:40:43,380 --> 00:40:48,700

that smear of lead well it's so unsatisfying it'd be better if the

420

00:40:48,700 --> 00:40:53,740

bullet still looked like a bullet at the end so a slight change of tack this

421

00:40:53,740 --> 00:40:58,500

series of tests we've switched from the lead slug to a full metal jacket this is

422

00:40:58,500 --> 00:41:03,060

a flat nose full metal jacket it's got a thin copper shell and we think this is

423

00:41:03,060 --> 00:41:07,420

going to give us a better chance of having an intact bullet at the end our

424

00:41:07,420 --> 00:41:11,500

test with the lead slug it's like trying to catch a raw egg as soon as you clamp

425

00:41:11,540 --> 00:41:18,460

down everything squirts out the back duck bill full metal jacket 99 milliseconds

426

00:41:18,460 --> 00:41:22,060

delay three two one

427

00:41:26,860 --> 00:41:31,860

once again it takes a little time that looks like we close too early but

428

00:41:31,860 --> 00:41:39,180

eventually bullseye where in your face it's no use the forces at work are just

429

00:41:39,220 --> 00:41:44,620

too great for the bullet to stay in shape still that's a good bullet that is

430

00:41:44,620 --> 00:41:49,740

a caught bullet just in case anybody disputes the high speed whatsoever I'd

431

00:41:49,740 --> 00:41:55,460

like to point out these wonderful track marks and a little exploded bullet right

432

00:41:55,460 --> 00:42:02,260

here this this is amazing evidence we actually got to catch a bullet by way

433

00:42:02,260 --> 00:42:10,420

of celebration they take a pot shot at a set of pearly whites in three two one

434

00:42:10,420 --> 00:42:22,180

oh but the teeth bite back I got hit in the face with a tooth I guess now that

435

00:42:22,180 --> 00:42:26,420

would wipe the smile off any magician's face all right guys catching a bullet

436

00:42:26,420 --> 00:42:30,860

with your teeth is it busted well we know that human reaction time isn't fast

437

00:42:31,060 --> 00:42:34,620

or accurate enough we had to use electronic timers and even then it was

438

00:42:34,620 --> 00:42:37,860

tough and human teeth just aren't strong enough we found that out from the pig

439

00:42:37,860 --> 00:42:42,100

experiment but any case on impact a bullet will explode and that's what it's

440

00:42:42,100 --> 00:42:48,420

designed to do so that sounds fully busted busted

441

00:42:53,860 --> 00:42:59,380

back at NASA the mythbusters are testing whether helium filled footballs fly

442

00:42:59,420 --> 00:43:05,740

further they fired 20 air filled balls and measured the distance of each one

443

00:43:05,740 --> 00:43:12,700

now it's time to fill the balls with lighter than air helium oh 13 pounds on

444

00:43:12,700 --> 00:43:19,740

the first try they fire off the first set of 10

445

00:43:21,900 --> 00:43:28,580

bang and the exit poles not looking good for helium off the top of my head just

446

00:43:28,620 --> 00:43:33,060

looking at how things landed it looks like the regulation ball filled to 13

447

00:43:33,060 --> 00:43:41,940

psi regulation pressure flies better than filling it with helium 10 final helium

448

00:43:41,940 --> 00:43:49,580

balls finish off the experiment dead on the money with its predecessor I love

449

00:43:49,580 --> 00:44:01,220

that I like consistent data I love consistent data when they're done

450

00:44:01,220 --> 00:44:06,820

they've got 60 data points for analysis but first impressions are that this myth

451

00:44:06,820 --> 00:44:11,500

is coming up short look I mean the myth is a helium filled football will fly

452

00:44:11,500 --> 00:44:16,260

farther than an air filled football they don't mean by an inch or something they

453

00:44:16,300 --> 00:44:20,660

don't mean by a foot that's there's the myth is that there's a significant

454

00:44:20,660 --> 00:44:24,340

improvement I think we could all assume that that improvement we something with

455

00:44:24,340 --> 00:44:27,820

everyone ago whoa why did the ball fly that far wait check it hey it's filled

456

00:44:27,820 --> 00:44:32,260

with helium kind of thing we're not talking tiny little differences what

457

00:44:32,260 --> 00:44:36,700

we're seeing is tiny little differences and even though they've yet to crunch

458

00:44:36,700 --> 00:44:41,420

the numbers early indications are that the helium balls have lost out to the

459

00:44:41,460 --> 00:44:47,140

air filled one based on what I'm seeing so far this is exactly what I would

460

00:44:47,140 --> 00:44:52,580

expect there's not much of a difference but in spite of what you might think a

461

00:44:52,580 --> 00:44:56,580

lighter ball is going to be easier to travel farther physics determines that

462

00:44:56,580 --> 00:45:00,940

it if we launch the ball at the same speed and it has more mass that's

463

00:45:00,940 --> 00:45:07,260

actually going to go further so it's all to do with inertia which according to

464

00:45:07,300 --> 00:45:12,300

Newton's first law of motion states that the heavier an object the more inertia

465

00:45:12,300 --> 00:45:18,900

it has and the more resistance to drag in other words a helium filled football

466

00:45:18,900 --> 00:45:24,780

should not fly as far as an air filled one fired at the same speed so does the

467

00:45:24,780 --> 00:45:30,020

experiment back up Newtonian physics or have the mythbusters blown a hole in the

468

00:45:30,020 --> 00:45:35,340

laws of science statistician Deborah Nolan concludes that the results are in

469

00:45:35,420 --> 00:45:40,900

conclusive well unfortunately the difference between helium and air filled

470

00:45:40,900 --> 00:45:47,500

balls is not statistically significant so that doesn't mean there isn't a

471

00:45:47,500 --> 00:45:50,900

difference that but I can't see the difference in the data that you've

472

00:45:50,900 --> 00:45:55,900

provided to get a clear statistical result would require a sample of

473

00:45:55,900 --> 00:46:00,340

thousands of kicks which just isn't possible I think today we end up with

474

00:46:00,340 --> 00:46:03,220

time to do thousands of trials and something Jamie's mustache is going to

475

00:46:03,260 --> 00:46:08,100

fall off but there is time for one final experiment just to make sure that

476

00:46:08,100 --> 00:46:14,300

every angle of this myth has been well and truly covered the whole time we've

477

00:46:14,300 --> 00:46:17,900

been testing a myth about hang time and maybe it's about something totally

478

00:46:17,900 --> 00:46:23,100

different like transfer of energy I mean suppose helium is springier at 13 psi

479

00:46:23,100 --> 00:46:26,900

than air and would allow a kicker's foot to impart more energy to the ball and

480

00:46:26,900 --> 00:46:30,300

make it go further the machine we were using in the hangers seem to me to

481

00:46:30,340 --> 00:46:34,500

replicate more of a throw than a kick so maybe it's about time that we actually

482

00:46:34,500 --> 00:46:41,020

build a kicking rig so this myth goes into extra time and to nail it once and

483

00:46:41,020 --> 00:46:46,860

for all they're gonna use a hammer there's your kicker okay the a-frame from

484

00:46:46,860 --> 00:46:52,660

the bullet in the teeth pendulum test should do nicely some minor modifications

485

00:46:52,660 --> 00:46:58,100

a high-speed camera and soon the sledgehammer is ready to crack this

486

00:46:58,140 --> 00:47:03,700

sporting nut all right let's try that Jamie we've got the camera cranked up to

487

00:47:03,700 --> 00:47:07,540

a thousand frames per second we're looking for how fast that ball takes

488

00:47:07,540 --> 00:47:11,580

off what the exit speed is if it's faster means there's a better transfer of

489

00:47:11,580 --> 00:47:16,900

energy we're gonna try and find that out so first test this is a air-filled

490

00:47:16,900 --> 00:47:26,100

ball to 13 psi okay it's high speed ready and three two one

491

00:47:28,460 --> 00:47:34,060

thrilling thrilling stuff let's bring the hammer down by studying the high

492

00:47:34,060 --> 00:47:37,940

speed footage they can calculate the speed of the ball as it leaves the

493

00:47:37,940 --> 00:47:41,820

frame the hammer speed which I'm measuring just to make sure each of our

494

00:47:41,820 --> 00:47:48,460

tests is consistent was 18.5 feet per second the balls exit speed this is

495

00:47:48,460 --> 00:47:55,780

good was 31.25 feet per second that's the baseline for comparison now for a

496

00:47:55,820 --> 00:48:02,580

helium football's last hurrah okay there it is 13 psi helium if this

497

00:48:02,580 --> 00:48:06,900

football's exit speed is higher than the air-filled one then the myth is still

498

00:48:06,900 --> 00:48:18,180

possible in three two one if not then it's game over so what's the final score

499

00:48:18,180 --> 00:48:25,060

it's exactly the same speed as before the 16 frames to travel six inches 32

500

00:48:25,100 --> 00:48:32,380

frames per foot equals 31.25 feet per second identical the games up for the

501

00:48:32,380 --> 00:48:39,540

myth of the helium football so finally the myth that a helium filled football

502

00:48:39,540 --> 00:48:42,780

flies farther than a football filled with air what's the verdict it's

503

00:48:42,780 --> 00:48:47,340

absolutely busted it's not about being lighter than air it's about having the

504

00:48:47,340 --> 00:48:52,420

ability to push through the air so actually being a little heavier as an

505

00:48:52,460 --> 00:48:57,620

advantage yeah no we found doing the math that if you kick a ball 70 yards one

506

00:48:57,620 --> 00:49:01,940

filled with helium and one filled with air the advantage is to the ball filled

507

00:49:01,940 --> 00:49:06,940

with air but it's only about an inch that's over 250 feet one inch of

508

00:49:06,940 --> 00:49:11,620

advantage it seems that the designers and manufacturers of these footballs have

509

00:49:11,620 --> 00:49:15,020

already figured all this out for some strange reason and these balls are

510

00:49:15,020 --> 00:49:18,660

pretty much maxed out in their ability to travel through the air there are the

511

00:49:18,660 --> 00:49:23,500

ideal balance of weight and size and shape well I don't think this is the

512

00:49:23,500 --> 00:49:27,020

last we've heard of this but I'm willing to call this one totally busted

513

00:49:27,020 --> 00:49:29,740

busted