Wedded to our tools: why expertise can hold us back (part 1)

In this two-part article with a difference, Sean Brady looks further afield to explore how 'expertise bias' may cloud our judgement.

Jump

The C-47 flew over the Missouri River and began circling above Mann Gulch, all the time buffeted by strong winds. Wag Dodge, the smokejumper foreman, along with the spotter, Earl Cooley, lay on the floor of the plane and looked out of the open door at the fire burning in the gulch below. It was 3:10pm. It had been a rough ride from the smokejumper base at Missoula, Montana. Most of the 15 smokejumpers squeezed into the plane behind Dodge were eager to jump, anything to get out of the bouncing plane. A number of the men had thrown up. One had taken off his jumpsuit and would fly back to Missoula and resign.

Cooley drew Dodge's attention to a spot on the northern slope, about half a mile from the nearest point of the fire, which now covered 60 acres (Figure 1) – small by US Forest Service standards. Dodge studied the jump spot. They wouldn't be able to land a rescue helicopter if something went wrong, but it would work. Then the pilot spoke in Cooley's earphones: they would be jumping from 2000 feet instead of the usual 1200 – the turbulent winds in the gulch were sucking the plane downwards. There would be more scatter of the men and equipment, but they'd just have to deal with that on the ground.

Dodge stood up and took position by the open door. The rest of the smokejumper crew followed suit. They would jump in 'sticks' – groups of four – with the plane circling back to make another pass over the gulch with each successive 'stick', before finally dropping the cargo. Dodge's static line was snapped onto a rod on the roof of the plane and the other end was connected to his parachute. Cooley remained lying on the floor beside the open door, ready to give the customary tap to the top of Dodge's left calf as the signal to jump – words were useless over the roar of the engine and rush of wind through the open door. Cooley judged the flight speed, wind speed, and all the time kept his eye on the landing spot. He waited for the right moment. Then Dodge felt the tap and stepped out into the air. In five seconds, his static line pulled taut and tore open his parachute. He began the one-minute drop to the ground below.

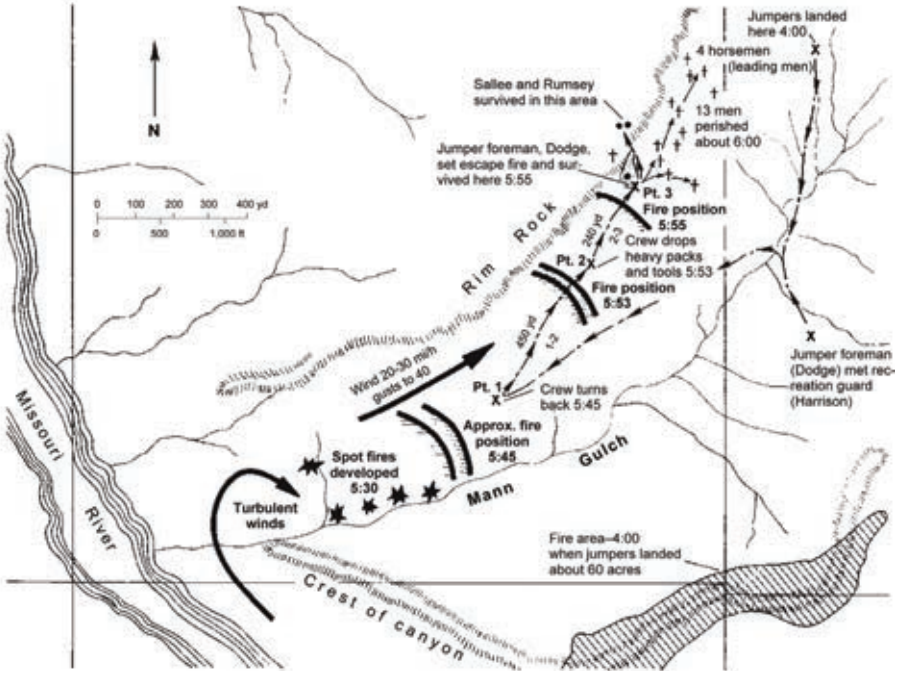

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Figure 1
Map of Mann Gulch showing sequence of events

The temperature was 36°C, the hottest day recorded in nearby Helena since records began. Such heat, when combined with the turbulent winds in the gulch, had the potential to create almost impossible firefighting conditions. And they would. Within two hours of these 15 men parachuting into this obscure gulch on the Missouri River, 12 would be dead or dying, making 5 August 1949 one of the most tragic days in US Forest Service history.

Mann Gulch

Mann Gulch lies in what is known as the 'Gates of the Mountains' in Montana. This 2.5-mile-long dry gulch, or valley, is bordered by the Missouri River at its foot. Its sides are steep and its northern ridge is topped with a tall rock 'reef' outcrop (Figure 2). To the south of the gulch is Meriwether Canyon and to the north is the ominously named Rescue Gulch. Inside Mann Gulch itself, the southern slope is dominated by thick ponderosa pine and Douglas fir, while the northern slope – which will become central to our story – is covered with waist-high 'bunch' and 'cheat' grass, with the odd patch of trees. To the firefighter, these two slopes create very different challenges. Fire burning among trees tends to burn at a terrific heat, but moves slowly, about 1mph. By contrast, fire on a predominantly grassy slope burns with considerably less heat, but spreads rapidly, sometimes travelling as fast as the wind driving it.

The fire in Mann Gulch had started the day before, when a lighting strike hit a band of ponderosa pine on the southern slope of

the gulch, down near the river. The fire was noticed the next day by a nearby lookout and Jim Harrison, a forest ranger. The smokejumpers from Missoula were called and a large team requested, but because all planes but one were on other fires, only Dodge's crew was sent. When Dodge first saw the fire through the open door of the C-47 he wasn't worried. He considered it a '10 o'clock fire' – they would dig a fire line around it that night and have it under control by 10am the next morning.

The smokejumpers considered themselves the elite of the US Forest Service's firefighters. Put together nine years previously, the group's role was to tackle and contain small fires before they grew and became more destructive. With speed being a critical element in their response, parachuting onto a fire was vastly more effective than wasting critical time tracking through rugged country. Their firefighting technique was to create a fire line. Their tools were shovels and saws, along with the all-important Pulaski axe, itself an invention of the Forest Service. The head of the Pulaski had an axe on one side and a hoe on the other, making it perfect for scraping away soil.

The smokejumpers would arrange themselves in a line on the flank of the fire, close to its front, and using the Pulaski dig a shallow trench about three-feet wide, removing all material down to mineral soil, including tree branches and vegetation. Denied fuel, the fire shouldn't cross the fire line, and by controlling its direction of spread they could 'drive' it onto open ground or a rock shelf where it would burn itself out. Mopping up followed, with the jumpers using shovels to dig holes and bury still smouldering logs. This was arduous and dangerous work, and a young man's game. Wag Dodge, the foreman, was the eldest at 33, with many of the crew being around 20. Robert Sallee was the youngest at 17, and underage.

Reconnaissance

All of the jumpers landed safely, then they heard a crash from further down the gulch. The radio's parachute hadn't opened and it was pulverised on landing. With no backup, the jumpers were now cut off from the outside world.

It took until 5pm to retrieve all their gear, then Dodge decided to track down Harrison, the ranger who was already battling the fire. He instructed the men to eat some food, with Bill Hellman in charge. The men ate, then tooled up with packs, shovels, saws and Pulaskis and began to make their way down the gulch towards the fire. Dodge found Harrison at the top of the southern ridge – he had spent the past four hours scraping a fire line to prevent the fire getting into Meriwether Canyon. They chatted, then both joined the crew now on the southern slope.

Dodge didn't like what he saw in the burning trees, nor did he like his men being on the southern slope among the tightly packed timber – the location was a potential death trap. He ordered them to make their way from the southern slope across to the northern slope. They would then make their way down that side of the gulch towards the river, so they could attack the fire's flank. If anything went wrong and the fire changed direction, they could always retreat to the river and seek shelter. As Hellman led the men away, Dodge and Harrison went to get something to eat. The crew crossed to the northern slope and began to make good progress down the gulch. They were feeling good and weren't worried. Dodge, however, eating and watching the fire from a distance, became concerned, to him the fire was about to boil up, and he needed to get his men out of the gulch. Dodge and Harrison quickly re-joined the crew. It was now 5:40pm.

Over the next five minutes they moved down the gulch towards the river, watching the fire on the opposite slope. Black smoke billowed from the trees, and when it occasionally lifted, Dodge saw large tongues of flame among the tightly packed timber. The wind was also starting to pick up to between 20 and 40mph. The heat was intense and Dodge's concern grew.

Blow-up

Suddenly, the fire spat hot embers into the grass at the foot of the northern slope, between the crew and the river (Fig. 1). Dodge saw it immediately, and ordered the men to turn round and quickly head for the top of the ridge – standard firefighting practice, as fire generally slows down at a ridge due to sparse vegetation and turbulent wind conditions. But as the fire spread in the grass and moved towards them, now only 150 to 200 yards away, it became clear to Dodge that this was no ordinary fire: it had an intense heat because of its origin in heavy timber and had speed because it was now in grassland.

Indeed, over the decades that followed, investigations would show that what

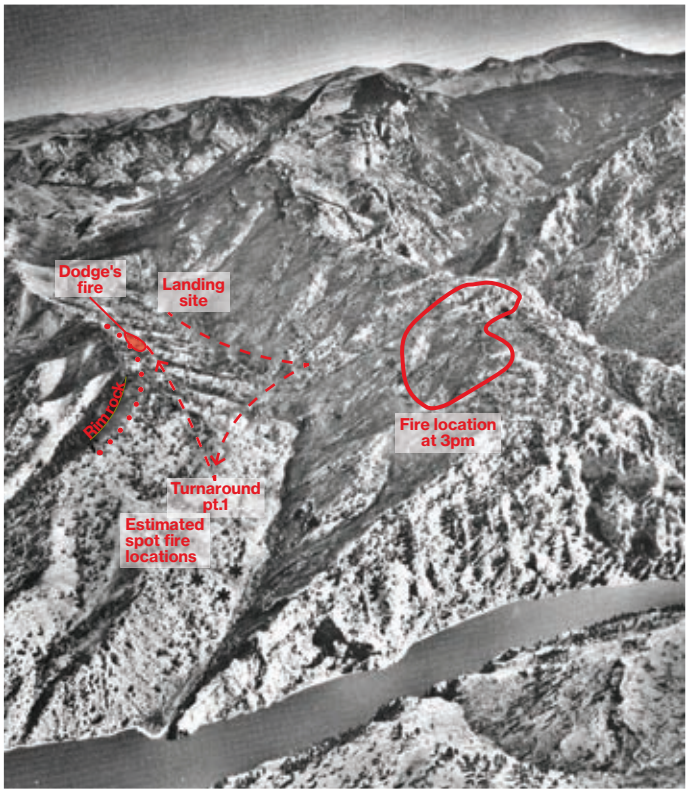

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Figure 2 Photograph of terrain showing key sites

happened in Mann Gulch that day was a 'blow-up' – a tornado of fire caused by intense heat, natural winds, along with wind generated by the blow-up itself; the hot air rises and draws cooler air in below, further fanning the flames. While the fire had started slowly and quietly in dense timber that morning, it would now move through the gulch with a stunning lethality and would go on to burn 4500 acres before a team of 450 firefighters would get it under control. For the crew in the gulch, however, their race with the fire would be over in just 11 minutes.

Race

At 5:45pm Dodge gave the order to turn. They had a 150–200-yard head start on the flames, and fire modelling would show that the fire was moving at about 1.3mph, giving them a lead of only four to five minutes[1,2]. Despite the danger, the men remained calm as they moved quickly up the steep slope in waist-high grass still carrying their heavy tools. They were averaging about 1mph, an impressive speed given the terrain, but the fire was moving faster and about to gain speed. In only four minutes, the fire had covered 200 yards and reached the point where the crew turned around. Its speed had more than doubled to over 3mph. Its flames were 16–20-feet high. With the fire 100 yards behind the men, Dodge gave the order to drop all tools – the shovels, the Pulaskis and the saws – so that the crew could run faster. The time was 5:53pm.

Amazingly, many of the crew continued to hold onto their tools. It was as if they simply couldn't drop them. One of the men, Walter Rumsey, remembered pulling a shovel from Eldon Diettert's hand, but even he couldn't drop it, instead looking for a lone tree to lean it against. He remembers the ranger, Harrison, with his heavy pack still on, making no effort to remove it. Harrison didn't even seem to consider that removing the pack would make him faster. It had taken the crew eight minutes to cover the ground from the turnaround order until the order to drop tools. The fire would now cross the same ground in only one minute.

Two minutes later, at 5:55pm, Dodge, then in the lead, broke through a bunch of sparsely packed trees and had a clear view to the ridge above him. It was still 200 yards away and topped with a rock reef that the crew would have to find a gap through. He realised that the crew wouldn't make it. While the men had increased their speed to 4mph, the fire was moving at almost 7mph, with flames 30-feet high and a fire front 200–300-feet thick. It was as if the wind itself was on fire. The air was black with smoke, Dodge's lungs were burning from exhaustion, and noise from the flames meant that even while shouting it was hard to communicate with the men.

It was then Dodge did something remarkable, believed to be the first use of a technique that has since become standard practice for wildfire fighters. He lit an escape fire (Fig. 1). Taking a match, he lit the grass in front of him and watched flames race up the slope, burning swiftly through the grass. As the crew caught up with him, he shouted at them to get into the ashes before him. Rumsey and Sallee, then leading, had no idea what he meant and thought he was mad to light another fire. They ignored him and continued running for the ridge. Dodge continued to call to the men, telling them to get in the ashes. Then through the smoke he heard someone shout "to hell with this, I'm getting out of here"[2]. From then on all the men just ran past, fixated on getting to the ridge. With a wall of flame bearing down on him, Dodge wet his handkerchief and tied it round his face. He stepped into the ashes and lay face down. Just three minutes had elapsed since the order to drop tools. It was now 5:56pm.

Sallee and Rumsey made it to the ridge and looked back. They saw the crew running past Dodge. The fire seemed to be all around them and had a deafening intensity. Then they watched Dodge lie down and the flames pass over him. In a period of just 60 seconds, the fire would go on to swallow Robert Bennett, Philip McVey, David Navon, Leonard Piper, Stanley Reba, Marvin Sherman, Joseph Sylvia, Henry Thol Jr., Newton Thompson, Silas Thompson and James Harrison, the ranger. Their time of death occurred sometime between 5:55pm and 5:57pm, estimated from the melted hands on Harrison's watch.

Sallee and Rumsey jumped through a crevice in the rock reef, not knowing whether it would lead to safety or trap them with the flames. Diettert was just behind them, but he paused at the crevice, seemed to decide against it, and instead made his way further along the reef. He didn't find another gap and the fire caught him.

Once through, Rumsey sat down beside a juniper bush. Sallee simply looked at him and said nothing. Then Rumsey seemed to realise that to sit there was to die, and he got up. They moved down the ridge and into Rescue Gulch. Then the fire poured over the top of the ridge and flowed towards them. They would survive by finding shelter on an exposed rock slide, moving around on it as the fire burned past them before dying out further down the slope.

Aftermath

For five long minutes the fire front passed over Dodge. He was lifted from the ground two or three times by its updraft. He was saved by the 18in. high layer of oxygen above the ground that the fire couldn't steal. When it moved beyond him he stood up, red eyed from smoke and covered in soot. It was 6:10pm. He looked up and down the slope. It was a barren wasteland. All was silent apart from the staccato explosions of trees that had been superheated by the fire. Then he heard moaning. It would turn out to be Sylvia, horrifically burned and drifting in and out of consciousness.

Sallee and Rumsey would stand up on their rock slide and see Hellman stumble into Rescue Gulch. Somehow he had made it through to the ridge and through the rock reef after being burned by the flames. He collapsed and they did their best to comfort him. Hellman asked Sallee to give a message to his wife, but afterwards Sallee couldn't remember what it was.

Eleven men died in the gulch, mercifully killed by lack of oxygen before the flames reached them. The death toll would go on to rise to 13 – both Sylvia and Hellman would die from their injuries before noon the next day. Only Dodge, Rumsey and Sallee walked out of the gulch alive.

Three questions

While there are many questions we can ask about Mann Gulch, we will start with three. Firstly, why did the crew continue to carry their heavy tools, slowing themselves down, and almost guaranteeing their death? Secondly, why did the crew ignore Dodge's escape fire and keep running for the ridge? Finally, what does a wildfire in a gulch over 60 years ago have to do with the business of engineering?

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